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Royal Botanic Gardens, Kew

Bulletin of Miscellaneous Information

No. 9 1926

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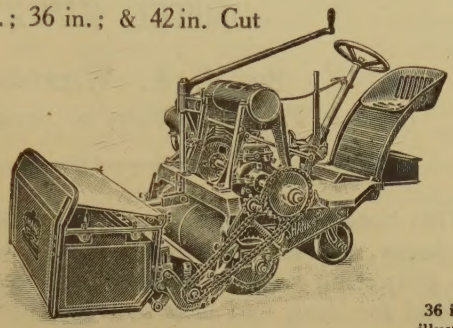

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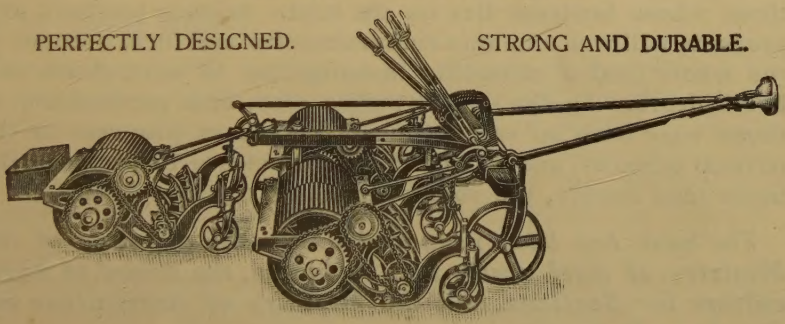

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BULLETIN OF MISCELLANEOUS INFORMATION No. 9 1926

ROYAL BOTANIC GARDENS, KEW

XLV.—EXHIBIT OF HISTORICAL PICTURES OF KEW.

For many years a collection of pictures and plans relating to the Royal Village of Kew, and to the early history of the Gardens during the latter part of the eighteenth century, have been exhibited amongst the botanical pictures in Museum III at Kew.

These pictures relate to the period when H.M. Queen Caroline, H.R.H. the Princess of Wales (Augusta of Saxe-Gotha) and the Earl of Bute, H.M. King George III and Sir Joseph Banks took so great an interest in the Royal Gardens and when Sir William Chambers was engaged to design several of the buildings.

It has long been felt that this interesting historical collection should be more adequately displayed, and on learning that some alteration was contemplated in the arrangement of the pictures in Kew Palace permission was sought for their exhibition in the building around which so much of the early history of Kew and the Gardens has centred.

The following letters show that H.M. The Queen has been pleased to convey the King's gracious permission for the pictures to be displayed in the Palace and they have now been hung in the King's Antechamber and in the King's Bedroom :—

"*4th March*, 1925. "Royal Botanic Gardens, Kew.

"Dear Sir Derek Keppel,

"I venture to write to you on the subject of Kew Palace in connection with a letter I have received through the Ministry of Agriculture and Fisheries from H.M. Office of Works. I do so because I believe Her Majesty's recent visit to Kew, when you attended Her Majesty, was in connection with the proposed re-arrangement of pictures at Kew Palace with which the Office of Works' letter deals.

"We have collected together in Museum No. III at Kew a large number of interesting pictures relating to the history of the Royal Botanic Gardens and the Village of Kew. These are not easily seen by the public as there is not sufficient room for their proper display. It has long occurred to me that one of the rooms in Kew Palace would be an excellent place for the display of all the old pictures to which I have referred.

(712) Wt. 55—7. 3, 3 & 2. 10/26. Wy. & S., Ltd. Gp. 50 (4).

"Now that a re-arrangement of the pictures in Kew Palace is under contemplation I venture to ask you whether you think I might approach Her Majesty and put forward the suggestion that space might be found in the Palace for the historic collection of pictures now in our Museum.

"I am, etc.,

"(Sgd.) ARTHUR W. HILL.

"Hon. Sir Derek Keppel, G.C.V.O., C.M.G., C.I.E.,
"Ambassadors' Court,
"St. James's Palace,
"S.W.1."

"*7th March*, 1925. "Buckingham Palace.

"Dear Mr. Hill,

"I beg to thank you for your letter of the 4th instant.

"I had the honour to submit to The Queen your request that your pictures relating to the history of the Royal Botanic Gardens and the Village of Kew might be placed in Kew Palace.

"I am commanded to say that there would be no objection to this from Her Majesty's point of view, provided that the necessary space is available for them.

"I am further to ask you to get into communication with Mr. Lionel Cust to whom I will also write. Mr. Cust will be able to say what can be done to further your idea as soon as he has completed the re-arrangement of pictures already there.

"I am, etc.,

"(Sgd.) DEREK KEPPEL,

"Master of the Household."

"*9th March*, 1925. "Royal Botanic Gardens, Kew.

"Dear Sir Derek Keppel,

"Please accept my best thanks for your letter of March 7th. I am very pleased to hear that Her Majesty The Queen has no objection to the pictures relating to the history of the Royal Botanic Gardens and the Village of Kew being placed in Kew Palace should there be the necessary space available for them.

"I have written to Mr. Lionel Cust asking him whether he will be able to meet me and see the pictures and discuss the question of their accommodation in Kew Palace.

"I am, etc.,

"(Sgd.) ARTHUR W. HILL."

"*7th December*, 1925.

"Lord Chamberlain's Office, St. James's Palace.

"Dear Sir,

"The Lord Chamberlain understands that you have been in communication with Mr. Lionel Cust as to the possibility of exhibiting in Kew Palace some of the interesting old prints of Kew Palace and its vicinity, which are at present in the Botanical Museum, and that you have come to the following agreement with him, which I am desired to confirm:—

"1. The private drawings, etc., to be transferred are to relate only to the Palace and early history of Kew Gardens, mainly in the 18th century, and not in any way to the botanical use of the Gardens or any places or buildings connected with the scientific work.

"2. The selection to be made by the Director and his Museum Assistant with his (Mr. Cust's) approval, if considered necessary.

"3. The selection thus made to be delivered ready framed as a collection en bloc, to be handed over by due agreement to the custody of the Lord Chamberlain. A list to be kept by each party to the transaction.

"His Lordship is visiting Kew Palace about 12 p.m. on Monday next, the 14th, and would like, if possible, to see these pictures in the room where they are to be exhibited. I am to ask if it would be possible to arrange this, and if you could meet His Lordship at the Palace at this hour and date.

"Yours faithfully,

"(Sgd.) G. CRICHTON, COL.,

"Comptroller."

"*8th December*, 1925. "Royal Botanic Gardens, Kew.

"Dear Sir,

"I have to acknowledge receipt of your letter of December 7th with reference to the exhibition in Kew Palace of some of the interesting old prints of the Palace and the Village of Kew, which are the property of the Royal Botanic Gardens, Kew, and are now in our Museum No. III.

"I have had the pleasure of having received two visits from Mr. Lionel Cust and we arranged as to the pictures that might be exhibited and the rooms in which they should be placed. No further action, however, has been taken in the matter, as I have been waiting to receive the sanction of the Lord Chamberlain for the proposed exhibition. I am very glad to receive your letter of December 7th which gives me the necessary authority to proceed in the matter.

"1. The drawings which are to be transferred relate, as stated in paragraph 1 of your letter, to Kew Palace and the

early history of The Royal Gardens and the Village of Kew. No pictures of a botanical character or of our recent buildings will be included in the collection.

"2. The selection has already been made by myself and by Mr. Cust, and I had merely been waiting for the official sanction of the Lord Chamberlain.

"3. The selection of pictures will be framed and I shall be prepared to hand them over to the custody of the Lord Chamberlain on the understanding, of course, that the pictures belong to the Royal Botanic Gardens, Kew, and are a loan to the Lord Chamberlain's Department. A list of the pictures will be handed to the Lord Chamberlain and a list will be kept in my own custody.

"I regret that it will not be possible to show His Lordship the pictures in the rooms where they are to be exhibited when he proposes to visit Kew Palace on Monday next, December 14th. I shall, however, be pleased to show him some of the pictures which have been selected in the Museum adjoining the Palace, and I will attend at Kew Palace at 12 o'clock on Monday next in order to meet His Lordship.

"Yours faithfully,

"(Sgd.) ARTHUR W. HILL.

"Col. The Hon. George Crichton, K.C.V.O.,

"The Comptroller,

"Lord Chamberlain's Office,

"St. James's Park, S.W.1."

The following is a list of the pictures and plans which are the property of the Royal Botanic Gardens, and are on loan to the Lord Chamberlain's Department.

The interest of the collection has been enhanced by the inclusion from the Palace Collection of an engraving of H.R.H. Augusta, Princess of Wales, who conceived the idea of laying out a Botanic Garden near the Palace in 1759-60 when the Earl of Bute acted as her botanical adviser.

List of pictures on loan to the Lord Chamberlain's Department, selected and hung by Mr. Lionel Cust, May, 1926.

1. Temple of Victory.
2. The Great Pagoda.
3. Kew Palace and Outbuildings. H.M.O.W. 1880.
4. A View of Richmond Palace fronting the River Thames, as built by King Henry VII. 1765.

5-6. Kew Palace.

7. A View of the Lake and Island seen from the Lawn, with the Bridge, the Temples of Arethusa, and Victory, and the Great Pagoda in the Royal Botanic Gardens, Kew.
8. A View of the Lawn from the Palace with the Pagoda, the Temple of Victory and the Colonnade.
9. A View of the Wilderness with the Alhambra, the Pagoda, and the Mosque.
10. A View of the Palace from the South side of the Lake, with the Temples of Bellona and Aeolus, and the House of Confucius.
11. View of the Aviary and Parterre.
12. A Prospect of the Royal House at Richmond.
13. View of the Menagerie, and its Pavilion.
14. View of the Palace from the North side of the Lake, the Green House, and the Temple of Arethusa.
15. View of the Lake and Island, with the Orangerie, the Temples of Aeolus and Bellona, and the House of Confucius.
16. A View of the Palace from a Hill in the middle of the Lawn with the Bridge, the Temples of Bellona, of Pan, of Aeolus, and the House of Confucius.
17. A View of Alhambra and Pagoda.
18. A Plan of the House, Gardens, Park, and Hermitage of Their Majesties, at Richmond ; and of Their R.H. the Prince of Wales and the Princess Royal at Kew, 1734.
19. View of the Palace at Kew, from the Lawn.
20. } View of Sion House and the parts adjacent, taken from
21. } the Road next the Royal Gardens, Richmond, 1750.
22. An exact Plan of the Royal Palace Gardens and the Park at Richmond with Sion House, etc., 1754.
23. The Observatory in Richmond Gardens.
24. View of the Old Palace at Kew.
25. View of the Prince's House at Kew.
26. North Prospect of the Ruin in the Gardens at Kew.
27. A New Plan of Richmond Garden, 1748.
28. View of Sion House, looking towards Kew, 1753.
29. View of the South Side of the Ruins at Kew.
30. Kew Green, 1785.
31. The King's Palace at Kew.
32. The Palace of H.M. George the Third, 1806.
33. The Old Palace, Kew.
34. A View of Kew.
35. } Kew Chapel.
36. }

37. Design for a Stone Bridge erected across the River Thames from Brentford in Middlesex to Kew in Surrey. First stone laid 4th June 1783. Opened for carriages 22nd September 1789.
38. New Palace, Kew, 1823.
39. At Kew. 1823.
40. Kew Bridge from Strand on the Green.
41. Kew Bridge from Strand on the Green, 1832.
42. Kew Bridge from the Ferry at Brentford.
43. Kew Bridge.
44. Merlin's Cave in the Royal Garden, Richmond.
45. Section of Merlin's Cave. 1736.
46. Old Kew Bridge. W. Lewis Turner, 1903.
47. View of the Hermitage in the Royal Gardens, Richmond, 1736.
48. View of Lord Bute's Erections at Kew, with some part of Kew Green, and Garden. 1765.
49. The House of Confucius in Kew Gardens. 1773.
50. The Mosque in Kew Gardens. 1772.
51. A View of the Pavilion in Kew Gardens.
52. The East View of Kew and Strand Green.
53. The Royal Palace at Richmond in Surrey.
54. The South Prospect of His Majesties House at Richmond.
55. The North Prospect of His Majesties House at Richmond.
56. View of the Town and Bridge of Kew.
57. A View of the New Bridge over the Thames, from Kew in Surrey to Brentford in Middlesex.

XLVI.—AMORPHOPHALLUS TITANUM.

An event of more than usual interest during the past summer has been the flowering of a fine specimen of *Amorphophallus Titanum* Beccari, the giant aroid of Sumatra.

During its period of growth this plant consists of a tuber and a single leaf, the leaf being renewed biennially until the flowering stage is reached. The tuber has been known to attain a circumference of 6½ feet, the blade of the leaf a circumference of 45 feet and the whole plant a height of 17 feet.

The tuber of the present plant was very kindly presented to Kew in 1924 by Mr. E. Jacobson, of Fort de Kock, Sumatra. During the summer of 1925 it sent up a leaf to a height of about 11 feet, the circumference of the blade being about 18 feet. In 1926 the plant commenced to grow in the second week of May. From July 23rd daily measurements were made of the height of the developing flower. On this date the height was 2 feet 11½ inches. For the next week growth was very rapid, from three to four inches a day. The rate of growth then diminished, the height on August

PLATE X.

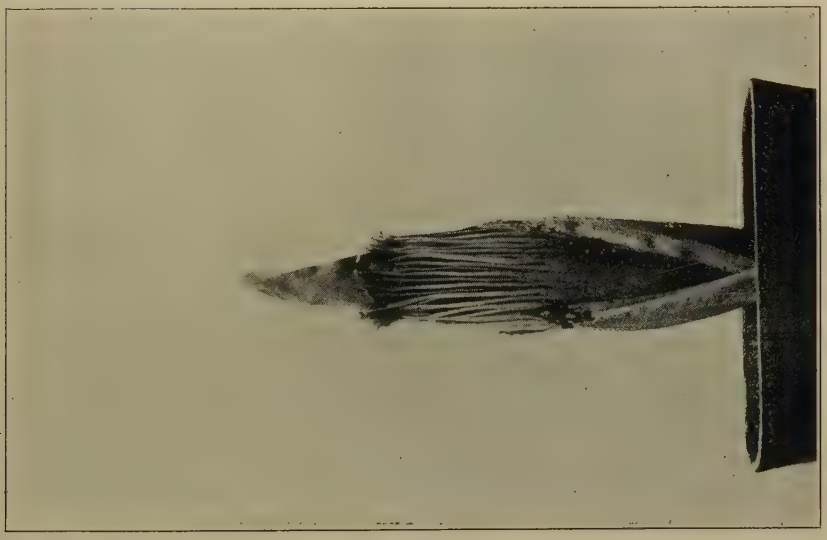

FIG. 2.

FIG. 1.

Amorphophallus Titanum at Kew. 1. At 11 a.m. 26th July, height 3 ft. 11½ in. 2. At 11 a.m. 1st Aug., height 5 ft. 6 in.

[*To face page* 374.

PLATE XI.

FIG. 4.

FIG. 3.

Amorphophallus Titanum at Kew. 3. At 11 a.m. 4th Aug., height 5 ft. 9 in. 4. At 5.30 p.m. 4th Aug., height 5 ft. 9 in.

To face page 375.]

1st being 5 feet 5¾ inches, and on August 4th, when the spathe opened, 5 feet 9 inches.

The spathe commenced to open at 9 a.m. on August 4th. By 2 p.m. it was fully expanded, and emitted a nauseating stench. Measurements at 2 p.m. were:—spadix 4 feet 9 inches long, 11½ inches diameter; spathe 3 feet 3 inches long, 3 feet 9 inches diameter; peduncle 1 foot long.

At its period of fullest development the plant presented a handsome sight, the reflexed inner surface of the spathe being of a dark chocolate-brown, and the spadix butter-yellow. The outside of the spathe was pale greenish-yellow, and the peduncle dark green mottled with a lighter shade.

The flower remained open and in good condition until noon the following day, when it began to close. The spathe withered and the spadix collapsed finally some two days later.

XLVII.—ON THE FLORA OF THE NEARER EAST: II*.

W. B. Turrill.

Elymus delileanus *Schult.* Mant. ii. 424 (1824).

This species is widely distributed in the Orient. At Kew specimens are preserved from Cyrenaica (Derna), Egypt, Syria, Palestine, Iraq, and Persia. It is of interest to record that the species also occurs in Crete and that a specimen from Cape Sidero in the Sitia province is at Kew, *Gandoger* 1211. This specimen is named *Agropyrum cretense* Gdgr. and agrees with the description published in Gandoger, Flora Cretica, 107 (1916), under the name *A. cretense* Coust. et Gdgr. The name has to be reduced to a synonym of *Elymus delileanus* but the extension of this species into Crete is a matter of considerable phytogeographical interest.

Polypogon maritimus var. **subspathaceus** *Duby* in Bot. Gall. i. 508 (1828).

The specimen in the Kew Herbarium of *Gandoger* 860, which is named *Chaeturus creticus* Gdgr., I have definitely identified with *Polypogon maritimus* var. *subspathaceus* Duby. Since the specimen agrees with the meagre description given in Gandoger's Flora Cretica, 110 (1916), I can only reduce his name to synonymy. The locality is Creta: Prov. Sitia, Palaeocastro.

Juncellus distachyos *Turrill* comb. nov.—*Cyperus distachyos* All. Auct. 48 (1789).

The writer's reasons for keeping the genus *Juncellus* separate from *Cyperus* have already been given (*Kew Bull.* 1922, 123). C. B. Clarke while considering the above plant a *Juncellus* reduced it to a variety of *J. laevigatus* C.B.Cl. with the varietal name *junciformis* C.B.Cl. (in Hook., Fl. Brit. Ind. v. 597, 1893). A

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* Continued from *K.B.*, 1926, p. 106.

careful investigation of the rich material of this genus at Kew has made it apparent that *Juncellus distachyos* can be easily distinguished from *J. laevigatus* (L.) C. B. Clarke, a species originally described from South Africa. *Cyperus cossyrensis* Tineo appears to be conspecific with *Juncellus laevigatus* C.B.Cl., and four collections with the former name make up the only material at Kew from Europe of *J. laevigatus*. All other specimens named *Juncellus laevigatus* C.B.Cl. from Europe in the Kew Herbarium are now placed under *Juncellus distachyos* Turrill.

The Loranthaceae of the Balkan Peninsula.

The species of *Loranthaceae* occurring in the Balkan Peninsula are *Arceuthobium oxycedri* M.B., *Loranthus europaeus* (L.) Jacq., and *Viscum album* L. These three species, and the genera to which they belong, are morphologically very distinct one from another, and there is no evidence to suggest either that they have recently been derived from a common ancestor, or that any one of them has originated in the Balkan Peninsula. It is therefore postulated that their extension into and dispersal within the Peninsula has been independent for each species. Each of the three species is a woody, evergreen, half-parasite.

Arceuthobium oxycedri occurs on junipers, chiefly on *Juniperus oxycedrus* L. but occasionally on other species, and very rarely on other genera of the *Coniferae* (as *Cupressus*). *Loranthus europaeus* is parasitic chiefly on *Castanea* and species of *Quercus*. *Viscum album* grows on many woody plants as hosts. Three varieties or races are recognized from the Balkan Peninsula: var. *platyspermum* Kell. (var. *mali* Tubeuf) parasitic on broad-leaved trees, var. *abietis* Beck parasitic on firs, and var. *pini* Tubeuf parasitic on pines and occasionally on spruce. Some authors (e.g. Hayek in Prod. flor. balc. i. 100) have separated off the two varieties growing on conifers as a separate species under the name *V. laxum* Boiss. et Reut. Tubeuf (Monogr. d. Mistel) has, however, given good reasons for regarding them as three varieties or races of one species.

The general distribution of the three species as here accepted is:—*Arceuthobium oxycedri*: Portugal, Central and Southern Spain, South-eastern France, Balkan Peninsula, Crimea, Caucasus, Asia Minor, Armenia, Syria, N. Persia, Punjab, Algeria, Azores, Kenya.* *Loranthus europaeus*: Saxony, Czecho-Slovakia, Austria, Hungary, Roumania, Yugoslavia, Italy, Sicily, Balkan Peninsula, Asia Minor, Kurdistan, N.W. Persia. *Viscum album*: Central Europe north to England and Southern Scandinavia, Iberian, Italian and Balkan Peninsulas, Central and Southern Russia, Asia Minor, N. Persia, N. India, and Eastern Asia (as the var. *luteum* Makino and the var. *rubro-aurantiacum* Makino).

No other species of *Arceuthobium* occurs in Europe or in the

* See Turrill; ***Arceuthobium oxycedri*** and its distribution, in *K.B.*, 1920, p. 264.

Mediterranean Region and all except four of the 18 known species are confined to North America. The distinct species *Loranthus grewingkii* Boiss. et Buhse is fairly widely distributed in Persia and *L. acaciae* Zuccar. occurs in Palestine. *Viscum cruciatum* Sieb. is found in Spain, Palestine, and Morocco.

The Balkan Peninsular distribution* of the three species is:—

Arceuthobium oxycedri M.B.

2. Greece: Parnassus and Oeta Phthiotidis.
3. Thessaly: Chaliki, Krania, Klinovo, Sermeniko in the Pindus.
4. Epirus: Syraku at the foot of Mt. Peristeri.
5. Albania: Bogdan under Mt. Tomor; near Scutari.
6. North Macedonia: to the east of Lake Prespa; Thasos, Mt. Elias.

6a. South Macedonia: Nidze Planina; Naoussa, slope of Bermic ridge, south of Vodena; Mt. Xerolivadon, Belasitsa Planina.

7. Thrace: Tekir Dagh; Čanakča; Kalfa-Keoi; near Domouzdere; Dedeagač; Bodoma; Dervent.

8b. Rodope massif: above Bačkovo; above Stanimaka; south of Daridere.

10. Serbia: Maglič; Demeronji; Zimovinku; Borju; Čačanskoj.
11. Montenegro: Gomšice.
12. Bosnia: Tasovčič (?).
13. Herzegovina: near Mostar between Bura and Zitomišlic, in the Dubrava forest; Čitluk, near Kručevič on the Narenta, near Neum; Stolac district.
14. Dalmatia: above Slano; Lesina; near Trebocconi and Kluju č near Dernis and near Macarsca.
15. South Croatia: Lika Krbava above Zengg; Buccari; between Buccariza and Porto Ré; Cirkvenica; near Fiume.
16. Istria: Puzzole near Carcauzze, Dragogna valley, and near Borutto; Osero.

Loranthus europaeus Jacq.

2. Greece: near Hagios Petros, Mt. Malevo, Laconia; Kastanitza, Laconia; Taygetus; Messenia; Mt. Manglava, near Francovritzi on the R. Alpheus, near Leondari; Euboea, Mt. Dirphys; in Muntzuraki forest on Mt. Kukkos Phthiotis.
3. Thessaly; Mt. Baba, near Krania, at the Korona monastery; near Sermeniko in the Pindus; Mt. Othrys.
4. Epirus: Mt. Handja near the monastery Hag. Elias and near Luros in the district Philippiada.
5. Albania: Renci, district Scutari.

6a. South Macedonia: Belasitsa Planina; Hortiak forest near Salonika.

6b. Athos Peninsula: Kerasia.

7. Thrace: Kalfa-keoi; Dabrav; Ledšakeoi.

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* See outline of scheme given in *K.B.*, 1924, p. 296.

8. North Bulgaria: Sredna-gora; Stara Planina; near Rahmanlij, Emineh Balkan; Kamčyk forests.
8b. Rodope massif; without exact locality; Pirin Planina.
9. Dobruja: Danube delta; forest of Cukarova.
10. Serbia: without exact locality.
12. Bosnia: numerous localities.
13. Herzegovina: numerous localities.
14. Dalmatia: Metcovic; Makarsca.
15. South Croatia: near Bunić and Graša.
16. Istria: Lippiza; Gropada; Mt. Cocusso; Mt. Slaunig; Trusche; between Tublje and the Slavnik chain; near Capodistria; Rozzo; Colmo; Draguč; Giuradi; Rizmanica; Lupoglava; Borutto; Caroiba.

Viscum album L.

1. Crete: Aphendi-Kavousi, Sitia.
2. Greece: Laconia, Taygetos; Attica, Parnes; Mt. Gerania.
3. Thessaly; near Chaliki, Krania, Klinovo, Velitsera in Pindus; Hag. Dionysios in Mt. Olympus.
5. Albania: Vallona district, Acroceraunia.
6. North Macedonia: Kriva-palanka.
6a. South Macedonia: Belasitsa Planina.
6b. Athos Peninsula: Mt. Athos.
7. Thrace: Kabakča; Avren; Tekir Dagh; Bosporus.
8. North Bulgaria: Loveč; Kamčyk forests; Aboba; Tirnova; Rasgrad; Longos forest near Varna.
9. Dobruja; forest of Cukarova.
10. Serbia: near Niš; near Belgrad.
12. Bosnia: numerous localities.
13. Hezegovina: numerous localities.
14. Dalmatia: near Unešič; Mt. Velebit.
15. South Crotia: near Fiume.
16. Istria: Mirarmar; Volosca; Contovelo; Grignono; between Pirano and Strugnano; near Corte d'Isola; above Isola; between Pisino and Lindaro; near Lončink; Capodistria.

Viscum album is the species with the widest general distribution and has likewise the widest distribution within the Balkan Peninsula. It is the only species occurring in Crete, and is found in both the Mediterranean and Central European domains. It is not known from the Cyclades, Epirus, Corfu, the Thracian islands, South Bulgaria, the Rodope massif, Novipazar, and Montenegro. In Greece it is known from the southern extremity of the Peloponnese northwards to Thessaly, and in the northern parts of our area it is known from Istria in the west to the Dobruja in the east. *Loranthus europaeus* is the species with the least wide general distribution but is the one with the second widest distribution within the Balkan Peninsula. It is not known from Crete, the Cyclades, Corfu, North Macedonia, the Thracian islands, South Bulgaria, Novipazar, and Montenegro. *Arceuthobium oxy-*

cedri has the second widest general distribution of our three species and the least wide Balkan Peninsular distribution. It is unknown from Crete, the Peloponnese, the Cyclades, Corfu, the Athos Peninsula, the Thracian islands, North Bulgaria, South Bulgaria, the Dobruja, and Novipazar. It is thus much more limited in the south and north-east than the other two species. The absence of *Juniperus oxycedrus*, the commonest host plant, in most of the north-east parts probably accounts for its limitation in that direction. Its distribution in Serbia is limited to those southern parts where *J. oxycedrus* occurs in enclaves of Mediterranean vegetation. However, this host plant is also found abundantly in Crete, the Peloponnese, and the Cyclades, where the parasite is unrecorded. An explanation of the last peculiar fact is still to seek. The long-distance distribution is certainly by birds*, pollination is mainly or entirely effected by insects†, and the supposed need for liquid water at germination‡ is as likely to be fulfilled in Crete or Greece as in other portions of the Mediterranean domain.

The genus Phagnalon in the Balkan Peninsula.

P. methanaeum Hausskn. This species is limited to Argolis: in rup. paenins. Methana pr. Vromolimni (*Haussknecht*) (Herb. Kew); ins. Hydra, in muris et rupibus (*Heldreich*) (Herb. Kew) and according to Hal. Consp. ii. 27 also in Aegina and ins. Jos (Ios) Cycladum. It is closely related to *P. graecum* but distinguished by the narrower, entire, usually longer leaves, and the broader, shorter, more spreading phyllaries of the involucre. There is also a morphological resemblance to the western *P. saxatile* Cass.

P. graecum Boiss. et Heldr. is widely spread in Thessaly, Greece and the Cyclades, and Crete. Outside the Balkan Peninsula it occurs in western Asia Minor. The records for Italy, Sicily, Malta, Lampedusa, and North Africa are uncertain. The plants quoted by Halácsy from the Ionian Islands are either *P. rupestre* DC. or intermediates between this species and *P. graecum*.

P. rupestre (L.) DC. This species is of wide occurrence in the Mediterranean Region, south, east, and west of the Balkan Peninsula. The specimens from the Balkan Peninsula which I have seen and refer to it are all from the western parts—Dalmatia and the Ionian Islands—and are neither quite equal to the common variety nor quite uniform amongst themselves. The Dalmatian plants have been taxonomically considered as *P. rupestre* subsp. *illyricum* by Ginzberger in Oesterr. Bot. Zeitschr. lxx. 197 (1921). On the whole they indicate that *P. rupestre* is vicarious with *P. graecum* towards which they verge. In Corfu it would appear

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* *K.B.*, 1920, p. 267.

† Tubeuf, Die Arten der Gattung *Arceuthobium* (*Razoumowskia*), in Naturwiss. Zeitschr. f. Forst- u. Landwirtsch. xvii. 167 (1919).

‡ Heinricher, Berichtigende Mitteilung über die Keimungsbedingungen der Samen von *Arceuthobium oxycedri*, in Ber. deutsch. bot. Ges. xxxv. 204 (1917).

that the two species meet and either hybridize or have fused, unless, as is possible, *P. graecum* originated as a morphological unit in the southern Adriatic district and spread thence into the eastern and southern parts of the Balkan Peninsula, where it is isolated from *P. rupestre*, but is not isolated in the southern Adriatic district. The critical examination of a series of Italian specimens might throw further light on the problem, but field studies and breeding work are alone likely to solve it. One specimen from Herb. Alexander Prior with one of Sieber's Cretan labels is exactly the same as the Dalmatian plants, and I suspect some mixing of labels.

P. pumilum S. et S. A well-marked species endemic to one mountain group in Western Crete. It is divisible into two varieties:—

α *tomentosum* Raul with the stems, leaves and phyllaries more or less white-tomentose.

β *glabrum* Boiss., with the stems, leaves and phyllaries glabrous.

The geographical distribution of the two varieties is as follows:—

α in rupestribus ad nives in H. Pneuma (Aspronuma) (*Baldacci* 125 in Herb. Kew); in summ. mt. Sphak. (*Sieb.* in Herb. Kew).

β in fissuris rupium in Gigilos Volakia ad aquem Luerfoli distr. Sphakia (*Baldacci* 71 in Herb. Kew); in summis montib. Sphacioticis Cretae alt. 7000 ft. (*Heldreich* in Herb. Kew); Sphakia in fissuris rupium mtis Hagis pneuma et Stravpodia 7000 ft. (*Heldreich* in Herb. Kew).

The morphological affinity is with *P. kotschyi* Sch. Bip. from Syria and Kurdistan. While the capitula of the two species are very similar the habits are quite distinct. *P. pumilum* is a dwarf high mountain plant growing in the fissures of rocks. At flowering it sends up leafless, or almost leafless, unbranched peduncles, 1 to 4 cm. high and terminated by a single capitulum. *P. kotschyi* is likewise usually a high mountain rock plant, but it has elongated leafy prostrate or ascending stems, which often branch below, or up to the middle, the branches finally ending each in a single capitulum. I am thus forced to regard *P. pumilum* as an old species or type which reached Crete, when this island was joined to an eastern continental mass, either as the species we now know or at least as a species morphologically closely related to it and to *P. kotschyi*.

XLVIII.—THE PROPAGATION OF CAMPHOR.

J. J. Blackie, R. T. D. Graham and L. B. Stewart.

In the majority of books the method recommended for raising Camphor commercially is by sowing of seed. Experience has shown that seedlings vary considerably in the percentage of camphor they produce. Even where seed is collected from a high grade tree the

seedlings are far from uniform. In certain areas to ensure uniformity of yield throughout a plantation vegetative propagation has been resorted to. Crevost & De Fenis* record in Tonkin that Camphor may be propagated by cuttings, layering, and grafting, as well as from seed.

Macmillan† places seed sowing first as the commercial method of establishing a plantation, but states that root cuttings are comparatively easy to strike whereas branch cuttings prove refractory.

Reproduction by branch cuttings has been experimented with in the Royal Botanic Garden, Edinburgh. Certain plants proved easy to propagate whereas one plant with apparently a much higher Camphor content proved refractory. A method of successfully rooting branch cuttings from the high grade tree was discovered and later an analysis of the plant was carried out.

Fresh green leaves—1·2 per cent. Crude Camphor.
Stems under ½ inch diameter—·1 per cent. Crude Camphor.
Stems over ½ inch diameter—·03 per cent. Crude Camphor.

These figures show that the leaves of the plant compare favourably with those of the plant commercially used for the production of Camphor in its natural habitat.

Twigs from this plant were difficult to root unless specially prepared. The method employed was to cause the twigs, subsequently to be used as cuttings, to develop for a time in darkness prior to their removal from the parent tree. A period of 14 days gave the most satisfactory results under the conditions obtaining in June-July at Edinburgh. Microscopic investigation‡ revealed the fact that extensive anatomical changes resulted from blanching or etiolating the twigs. It is considered that these changes contributed to the successful rooting of these twigs. The twigs after treatment were placed in a tropical propagating frame (75° F.). A copious supply of water assisted callus formation and roots soon appeared.

This method may not be practical in a forest but it is suggested that a modification may prove useful. If a high grade tree were found it might be advisable to cast the tree and layer the branches. In this way there is a possibility of obtaining a standard of high grade plants.

[vi, 80]

XLIX.—DISEASES OF ECONOMIC PLANTS IN THE AZORES. Mathilde Bensaude.

A preliminary survey of the fungous diseases of crop plants of the island of St. Michaels was carried out from September to December, 1923. With a few exceptions the diseases reported are of common occurrence wherever the host plants are cultivated.

* Crevost, Ch. & De Fenis, F.: Bull. Ec. de l'Indochine; xxiv, 1921.
† Macmillan: Tropical Gardening and Planting; 1925.
‡ Reid, O.: Trans. Bot. Soc, Edinburgh; xxviii, 1923.

In St. Michaels the prevalence of fungous diseases is general, due mainly to the high atmospheric humidity and the continuous growing season. The winters, in fact, are not severe enough and the summers not hot and dry enough to check plant growth and the propagation of fungi. As can be seen from the table following, the climate in the island is temperate throughout the year and the rainfall is rather high. During 1923 the average relative humidity is given as 74.74, and except for three days in August and one in September clouds were recorded throughout the year ; the annual rainfall in 1923 was registered, at an altitude of 175 metres, as 811.4 mm. The year was unusually rainy from February to May and exceptionally dry from June to November. The lowest and highest mean temperatures were 14·62° C. for March and 22·96° C. for August respectively.

Meteorological Observations Registered in St. Michaels from 1894 to 1923.

Months.	Average monthly temperature. Degrees centigrade.	Average monthly rainfall in mm.
January	14·63	114·2
February	14·34	124·1
March	14·35	92·3
April	15·35	80·4
May	16·81	88·7
June	19·06	53·7
July	21·35	32·2
August	22·37	51·1
September	21·22	97·7
October	19·02	132·2
November	16·98	144·6
December	15·65	124·4
Average	17·59	95·2 1125·6 mm. Total rainfall during one year.

Cereals.

Maize. Rust (*Puccinia Sorghi*).—The maize yield in 1923 was exceptionally fine. This crop is extensively grown in the island from sea level up to an altitude of 700 to 800 metres. The only disease observed was rust, characterized by the yellow streaks on the leaves. Both teleuto- and uredo-sori were found in every case. Almost every plant was infected but no apparent harm was caused. No traces of aecidial sori were found on the leaves of *Oxalis* sp. growing in the vicinity.

Root Crops.

Sugar Beet.—This crop is widely cultivated and supplies one important sugar factory. The agricultural adviser attached to this factory, Mr. A. de Freitas Pereira, reports the following fungi as occurring on beet:—rust (*Uromyces betae*), leaf spot (*Cercospora beticola*), *Sclerotinia libertiana*, *Sphaerella tabifica* and *Typhula variabilis*. The last is, in his opinion, the most destructive and causes up to 50 per cent. rot of the roots in certain fields. It is especially severe where root knot (*Heterodera radicicola*) has been found simultaneously. The disease has frequently been observed in fields hitherto not cultivated for beet.

During the late summer and autumn only two fungous diseases of beet were found, the most striking being the leaf spot (*Cercospora beticola*). Approximately 100 per cent. of the plants in the majority of fields were attacked, in most cases the tops becoming completely scorched by the middle of August. The peasants attributed the scorching of the leaves exclusively to the dry weather. After the roots are formed the premature destruction of the foliage is considered quite unimportant by the growers. The people at the factory, on the contrary, attribute the usual low sugar content of the sugar beet grown on the island to this and other leaf diseases.

A root rot was also observed, destroying some 30 per cent. of the roots in one field which was infected by *Heterodera radicicola*. The roots turn brown, remain fairly hard and interior cavities are formed. These, as well as the surface, are covered with a fluffy white mycelium and small round sclerotia about 1 mm. in diameter. This growth is attributed by Mr. A. de Freitas Pereira to *Typhula variabilis*, and his diagnosis is probably correct. No perfect stage, however, has yet been observed.

Red Beet, Swiss Chard Beet.—Leaf spot (*Cercospora beticola*); in a kitchen garden in November and December.

Carrots.—Mildew (*Erysiphe* sp., probably *E. polygoni*); early in September on carrots grown between banana plants. The tops were scorched and the roots remained undersized.

Vegetables.

Cabbage.—Black rot (*Pseudomonas campestris*) was observed on white head cabbages. Kale growing in the vicinity remained healthy. Leaf spot (*Mycosphaerella brassicola*) frequent on both kale and cabbage.

Celery.—Leaf spot (*Septoria apii*); a slight infection was seen in one vegetable garden.

Onion.—Black mould (*Sterigmatocystis nigra*); general on yellow onions at the market of Ponta Delgada.

Parsley.—Leaf spot (*Septoria petroselini*); observed during November. The plants were not killed but the leaves were badly scorched.

Peppers (*Capsicum annuum L.*).—Leaf mould (*Cladosporium* sp.); during September, October, and November, on plants grown in several gardens. The symptoms are olivaceous velvety patches on the lower surface of leaves ranging in diameter from 1 to 1·5 cm. The leaves become yellow and drop. The causal organism is apparently identical with, or resembles very closely, *C. herbarum*. Mosaic distortion and characteristic mottling of the leaves were frequently observed.

Potato.—Blight (*Phytophthora infestans*) is very serious in the island, as might well be expected from the prevalence of high atmospheric humidity and the even mildness of the temperature during the whole year.

Virus diseases (leaf roll and mosaic). The latter was much more prevalent than the former. On Magnum bonum and a purple unnamed variety, grown on the island for the last twenty years, a very high percentage of severe mosaic was observed.

Common scab (*Actinomyces scabies*) and rot caused by Blight were the only tuber diseases observed.

Pumpkins, Squashes.—By September all vines were attacked by mildew (*Erysiphe* sp.). The leaves, when badly infested, appear scorched and die prematurely. The flowers and fruit sets are apparently absolutely immune.

FRUIT.

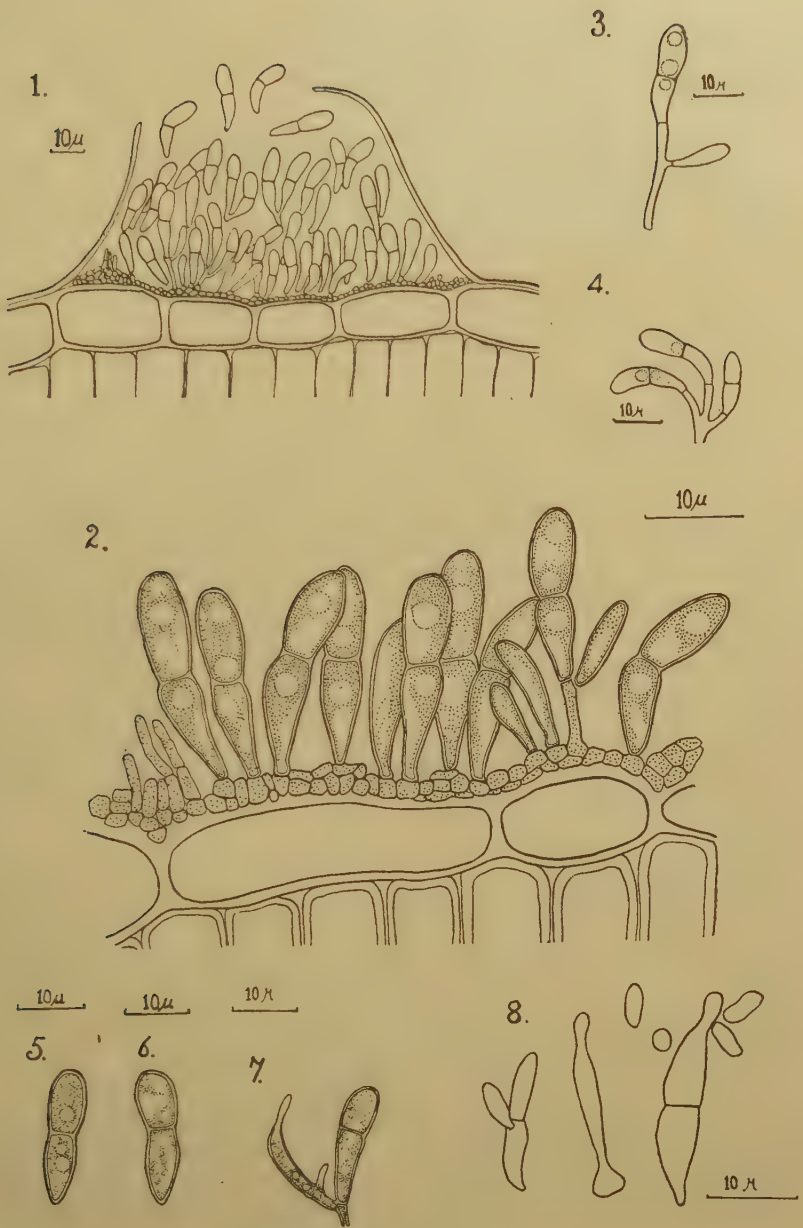
Apples.—Bitter rot (*Glomerella cingulata*). This fruit rot is very common in the island and attacks 100 per cent. of the fruit of certain varieties as soon as it ripens. A few mummified apples of the previous season's crop were seen hanging in the orchard.

Leaf spot. A species of *Phyllosticta* caused frequent spotting of the leaves of apples of many varieties. The lesions are light brown, circular clean cut, visible on both sides of the leaf, from 0·5 to 3 mm. diameter. Pycnidia are scarce. The pycnospores are obtuse, hyaline, biguttulate, and measure 5 μ by 1 μ.

Leaf spot (*Marssonina* sp.). The disease was found on almost every tree of two relatively large orchards in November and December, and the fungus causing it is possibly identical with *Marssonina mali* Henn.* Occurring so very late in the season it did not cause any damage whatever. The infected leaves become yellow, showing numerous green blotches of irregular and rather indefinite contour. These green marks vary in size from 0·5 to over 1 cm. On careful examination one or several acervuli can be seen in every green strand. On fresh material the acervuli measuring from 90 to 150 μ appear, when examined with a hand lens, like minute raised translucent domes; on dry leaves they become wrinkled and brown.

On cross sections the structure of the lesions is easily understood. The fungus develops entirely between the epidermal cells and the cuticle, which is raised and distended and finally broken by the

* *Miyake*, Ichiro in Botan. Magaz. 21: 40–54, Tokyo, 1907.



Marssonina (*mali* ?)

1. Cross section through an acervulus, host cells and stromatic layer (slightly diagrammatic). 2. Detail of stroma and spore attachment (host cells somewhat diagrammatic). 3 & 4. Branched conidiophores and immature conidia. 5 & 6. Mature conidia. 7. Mature conidium; an immature conidium is budding off small sporules. 8. Conidia budding off sporules in moist chamber.

pressure of the numerous ripening spores. (Fig. 1.) A narrow brown stromatic growth develops on the epidermal cells, these become markedly discoloured with a brown content and slightly flattened. The spores arise from this stromatic layer: some are sessile, others are borne on conidiophores, the length and appearance of which, as may be seen from the accompanying figures, varies greatly. (Fig. 2.) Conidiophores continue to elongate for a long while, budding offside branches basipetally on which new spores are formed. (Figs. 3 and 4.) The spores are bicellular, hyaline with a thin wall and a granular protoplasm, in which two or more large oil globules are fairly constant when they approach maturity. The spores are asymmetric in relation to both the perpendicular and the horizontal planes; the top cell is generally broader than the lower one and often, although not always, longer. The mature spores vary in size from 20 to 30 μ long by 6 to 7 μ wide. (Figs. 5 and 6.)

The *Marssonina* found in the Azores is somewhat different from *Marssonina mali* Henn. as recorded by Dr. Miyake on apple leaves in Japan. The presence of well developed, unbranched conidiophores (5 to 8 μ long by 1·5 to 2 μ wide) seems to be constant in Japanese material. The spores, although very similar in shape to those of the *Marssonina* found in St. Michaels, are markedly shorter, measuring from 14 to 20 μ long by 4·5 to 6 μ wide.

The morphological differences might perhaps warrant the creation of a new species. The differences in size depend, however, in all probability on variation in prevailing conditions and it is better to refrain from definitely establishing a new species until an opportunity occurs of comparing specimens and cultures from both countries.

All attempts at germinating this fungus were unsuccessful whether in distilled water, tap water, on water agar, or potato agar. Further attempts will be made. In cross sections of leaves which had been left for a couple of days in a moist chamber it was found that in many of the acervuli the immature spores of *Marssonina* were budding off small hyaline spores about 5 μ long by 2 to 3·5 μ wide. (Figs. 7 and 8.) Data concerning overwintering and period of infection are wanting.

All efforts of the writer to find either Apple scab (*Venturia inaequalis*) or pear scab (*V. pirina*) in orchards or in the market were fruitless. The absence of scab is very noteworthy, considering that most fruit stock is imported from the Portuguese mainland where these diseases are of general occurrence. The quarantine service in the island is so very inadequate that scabbed trees must certainly be imported every year and it would appear that climatic conditions alone must explain the absence of this disease in the island.

Bananas.—Ripe rot or Anthracnose (*Gloeosporium musarum*). This was frequently observed forming numerous brown, depressed,

clear cut lesions on ripe fruit. *Musa cavendishii*; the variety cultivated has up to now been grown only for local consumption. Experiments on the export value of the crop are under way.

Fig. Rust (*Kuehneola fici*).—The uredo stage of this rust was observed on fig trees all over the island, causing premature defoliation. The fruit is also attacked but seems to suffer more from the exposure to wind and sun owing to defoliation than from the direct effects of the parasite.

Grape.—In one garden under observation powdery mildew (*Uncinula necator* Burr.) caused much damage, particularly on the white varieties of *Vitis vinifera*. Varieties of *Vitis labrusca* showed either only a slight russeting of the infected berries or appeared quite immune, with no sign of the fungus on the berries.

Brown rot (*Botrytis cinerea*) developed on muscat and chasselas following the outbreak of powdery mildew.

Downy mildew (*Plasmopara viticola*) developed to a slight degree during September and October on leaves and vines which had been sprayed late in July with bordeaux mixture.

Cluster rot (*Physalospora baccae* Cav.). This disease, so aptly named by Nishikado,* destroyed the entire crop in a large garden in which varieties of *Vitis vinifera* and *V. labrusca* were grown. The symptoms appear on mature or almost mature clusters; the pedicels dry, the bunch wilts suddenly, and the berries become flaccid and many of them drop. On sectioning such berries, one finds that the pulp is abnormally watery and that the vascular tissue in the vicinity of the seeds has become brown. Berries which do not drop, whether of the white or dark varieties, turn lavender in colour, gradually become wrinkled and are finally transformed into somewhat tough purple-brown mummies. The surface of these is covered with tiny dark pycnidia from which, after a few days, white spore masses ooze.

A microscopical examination of a flaccid berry shows that the pulp is penetrated throughout by intercellular, hyaline hyphae about 5 μ in diameter. The pycnidia and spores of this fungus correspond absolutely in shape and measurements to *Macrophoma reniformis* as described by Viala and Ravaz.† Both the macroconidia (20 μ long) and the microconidia (5 μ long) were found on the berries; the perfect stage, however, was not observed. A culture started from a single macroconidium on grape juice agar produced, after twenty days, typical pycnidia with perfectly normal macroconidia.

Peaches.—Scab (*Cladosporium carpophilum*) caused spotting and cracking of fruits, and on some varieties of peaches very severe defoliation.

Shot hole (*Coryneum beijerinckii*) is common on the leaves of all

* *Nishikado*, J. Ann. Phytopath. Soc. Japan. I, part 4 : 20–41, 1921.
† *Viala & Ravaz*, Le Black Rot. Montpellier, 1886.

stone fruit trees. Spotting and cracking of peaches was also observed.

Rust (*Puccinia pruni-spinosae*). Uredo- and teleuto-spores were observed on peach leaves in September, October, and November, the defoliation caused was very slight. The aecial stage on Anemones has so far not been observed.

Plums.—Rust (*Puccinia pruni-spinosae*), found on leaves of *Prunus domestica*.

Shot hole (*Coryneum beijerinkii*) was common on the leaves of European and Japanese varieties of plums. The fruit was not affected.

Melon.—Powdery mildew (*Erysiphe* sp.). Bad outbreaks of this disease were observed in several localities.

Miscellaneous.

Tea.—The tea bushes grown in the island are mostly of the small Chinese variety, the Assam large-leaved tea bush is grown only by a few planters.

Red rust (*Cephaleuros mycoidea* and *C. parasitica*). A rust coloured, hairy, algal growth was observed on the twigs and leaves of the bushes in one garden about twenty years old, in which manuring and cultivation had been badly neglected since the beginning of the war, and in which pruning and close plucking of the worst type was annually practised. Specimens of infested twigs and leaves sent to the Imperial Bureau of Mycology at Kew were kindly examined by Mr. Mason, who recognized the well-known so-called red rust of Ceylon, recently investigated by Petch.* The growth on the leaves is, according to this author, *C. mycoidea*, a saprophyte, and that on twigs, which produces a gray discoloration of the bark and a die back of young wood, *C. parasitica*.

A species of *Cephaleuros*, probably *C. mycoidea*, was found on the leaves of rose bushes and trunks of *Cryptomeria japonica* grown in the vicinity of the tea bushes. Apparently, however, the presence of this *Cephaleuros* was not harmful to the plants.

Gray blight (*Pestalozzia theae*). Typical gray patches at the extremity and margins of the leaves were observed. The causal organism corresponds in every respect to that found in Japan, Ceylon, etc. Only weak bushes are attacked, and usually only the older leaves are blemished.

Brown blight (*Colletotrichum camelliae*) was also observed on weakened bushes; this, and the previous named disease, are of small economic importance.

Box.—Leaf rust (*Puccinia buxi*). The teleuto sori of this rust were found on all the bushes.

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* *Petch*, T. Tropical Agriculturist, lvii, part 3, pp. 188–192, 1921.

Camellia.—Gray blight (*Pestalozzia guepini*), on leaves of bushes weakened by drought or poor tillage; the same fungus caused also a die back of twigs.

Roses.—Mildew (*Sphaerotheca pannosa*) very common.

Rust (*Phragmidium subcorticatum*) caused defoliation in certain varieties of roses.

Crown gall (*Bacterium tumefaciens*) in one case at the base just below soil level.

Violets.—Leaf spot (*Cercospora violae*) commonly observed in most gardens.

L.—REVISION OF THE AFRICAN TODDALIEAE. I. C. VERDOORN.

The present paper is an attempt at a revision of the African genera and species of the tribe *Toddalieae* of the family *Rutaceae*. Great difficulty had been experienced in South Africa in naming specimens belonging to this group, on account of the diverse views with regard to the limits of both genera and species. In many respects this was due to imperfect knowledge of the group in general, and also perhaps to the flowers being unisexual or polygamous.

A preliminary revision of the South African material was undertaken in the National Herbarium, Pretoria, with the intention of its being completed at Kew. It was then evident, however, that a complete review of the whole of the African species of the group was necessary for the result to be at all satisfactory.

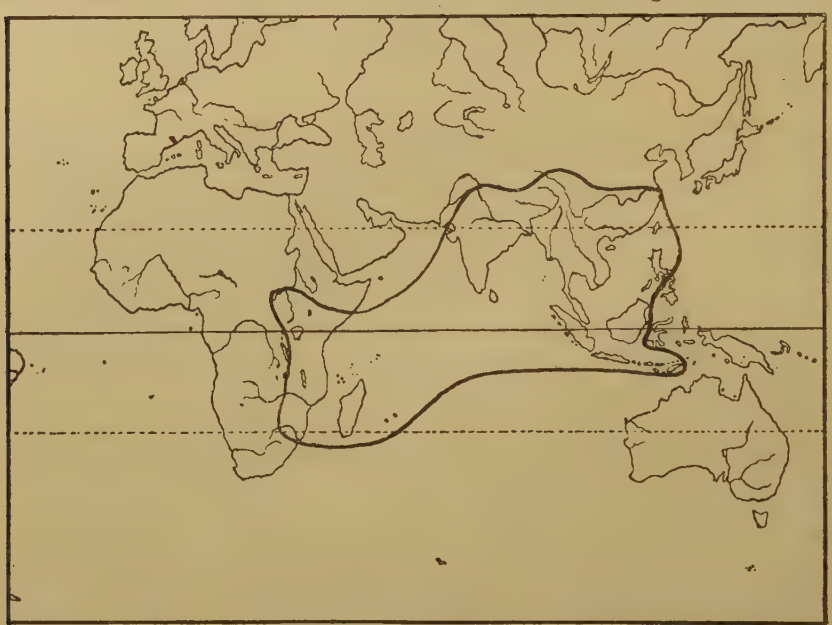
I am much indebted to the Director of the Royal Botanic Gardens, Kew, for facilities in carrying out this work, to the Keeper of the Department of Botany, British Museum (Natural History), South Kensington, and also to Dr. L. Diels (Berlin), Prof. Lecomte (Paris), and Prof. Dixon (Dublin) for the loan of type specimens. My greatest debt of thanks is due to Mr. J. Hutchinson who has guided and assisted me with the entire compilation, especially with regard to the points on evolution, the theories put forward on this subject being in agreement with his ideas.

The tribe *Toddalieae* in Africa is represented by trees and shrubs with alternate or subopposite, digitately compound or unifoliolate leaves, unisexual or polygamous flowers, united or free carpels with a single terminal style, and fleshy indehiscent fruits. The family *Rutaceae* is no doubt considerably advanced in its floral structure, and although in some genera we meet with comparatively free carpels, the freedom in this case is probably *secondary* and not primitive, because the carpels are connected by a single common style. Those genera with *free* carpels are therefore considered to be more advanced than those with united carpels. With regard to the leaves, those genera or species with the greater number of leaflets are more primitive than those having only a single leaflet,

the latter being clearly a case of reduction. This is very well shown in the genus *Araliopsis*, which has 5 leaflets and united carpels and is taken to be the most primitive member of the group under review. This tendency to reduction to a single leaflet is evident in representatives of at least two genera and sometimes occurs on the same plant with the normal type of leaf.

Value of Characters.

Generic characters.—As the group is apparently a very homogeneous one, there are few characters on which to separate the genera satisfactorily. For want of anything better I have had to rely mainly on the relative number of stamens and petals, but the more numerous stamens seem to be correlated with a greater number



Range of Toddalia asiatica *Lamk.*

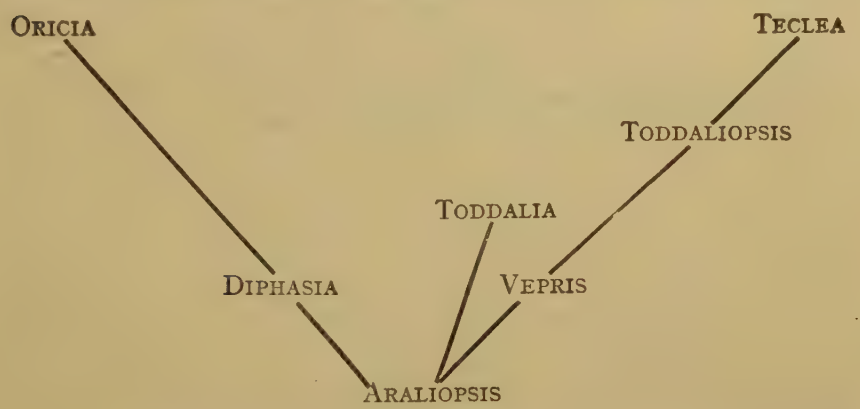
of ovary cells, and the genera showing this combination, i.e., *Vepris* and *Toddaliopsis*, are separated from the others by these characters. The number of ovary cells seems a good character for dividing *Toddalia* (4–7-celled) from *Teclea* (1-celled) and *Diphasia* (2-celled).

Specific characters.—Owing to the lack of good herbarium specimens I have endeavoured to frame the keys to the species on the more obvious characters such as inflorescence, number and shape of leaflets, number and evidence of gland-dots, and the indumentum.

Geographical Distribution.

With the exception of *Toddalia* and *Vepris* all the genera are confined to Africa and the Mascarene Islands. *Toddalia* (see map)

ranges from the Transvaal along the East African plateau, the Mascarene Islands to South Eastern Asia, where in the Malay Archipelago it scarcely extends beyond "Wallace's Line." *Vepris* is represented outside Africa by a single species only, *V. bilocularis* Wight & Arn. It occurs in India only in the state of Travancore on the Western side of the peninsula. The genus most widely spread over Africa and the Mascarene Islands is *Teclea*, and it is noteworthy that it possesses the most advanced characters in the group. *Oricia*, another advanced genus in which the carpels have become free, is also fairly widely spread, ranging from French Guinea through the Congo Basin as far South as the Transkei. The remaining genera are very small and are quite locally distributed, *Araliopsis*, which perhaps shows the most primitive characters, being found only in the Gabon region, where such relics are somewhat numerous. *Diphasia*, a nearly allied genus, has a slightly wider distribution as far as Angola. The remaining genus, *Toddaliopsis*, is endemic to Zanzibar and thus occurs within the range of its most nearly allied genus *Vepris*.



The diagram above shows the phylogenetic relationship of the genera under review.

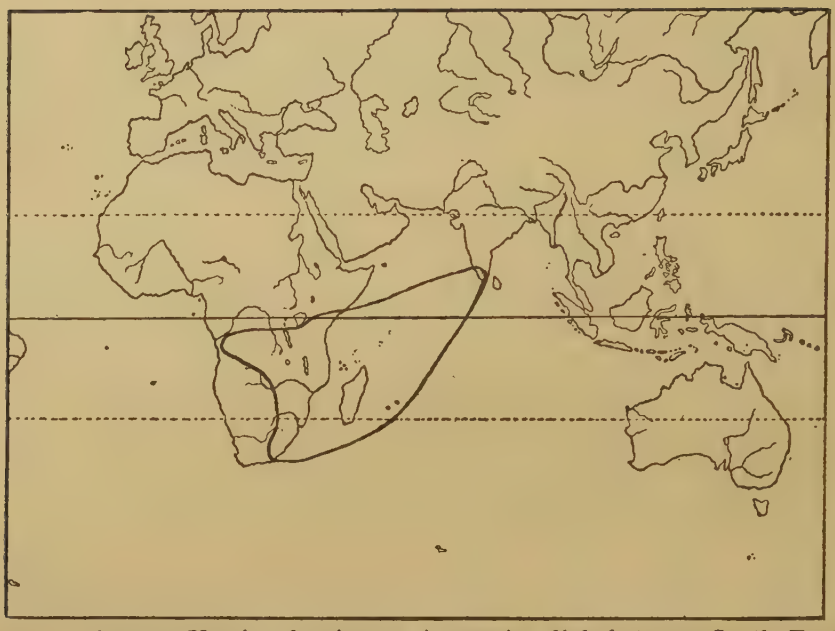
Imperfectly known species.

Teclea ? acuminata Engl. in Engl. Bot. Jahrb. 36: 245 (1905). This specimen, which has a long style overtopping the stamens, probably does not come into the tribe *Toddalieae* at all. The material is insufficient to place it correctly.

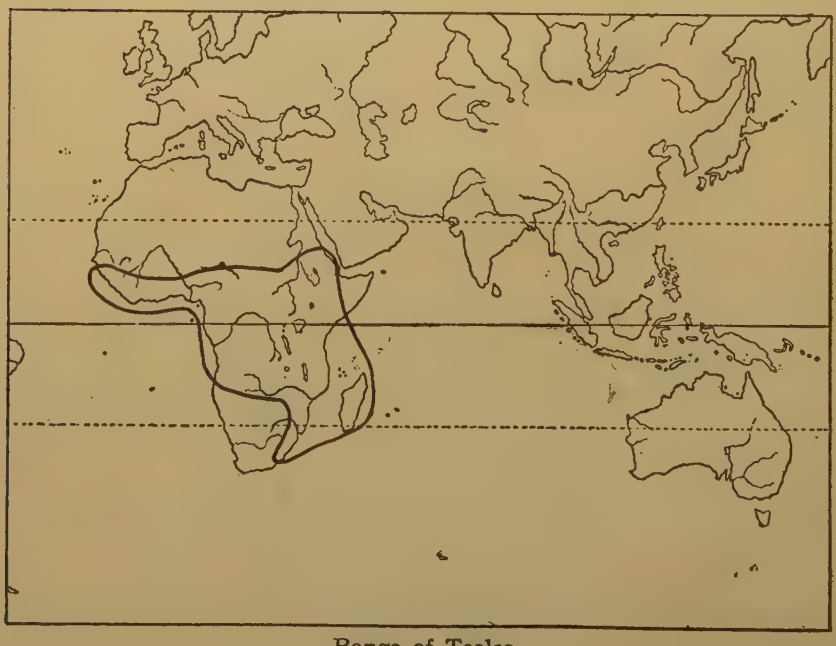
Teclea salicifolia Engl. l.c. 244 (1905). I have not seen this specimen and cannot place it from the description.

Teclea utilis Engl. l.c. 245 (1905). Described from leaves only and it is therefore impossible to assign it to its correct genus.

Teclea spathulata Engl. Pflanzenw. Afr. 3, 1: 757 (1915). The description is so meagre that I have been unable to classify it. I have not seen a specimen.



Range of genus Vepris, showing an interesting link between South East Africa and the Indian Peninsula.



Range of Teclea.

Teclea gracilipes Engl. in Engl. Bot. Jahrb. 54: 308 (1917). Described from leaves only.

Teclea ebolowensis and *Teclea heterophylla* are placed by Engler under *Teclea* in Pflanzenw. Afr. 3, 1: 756 (1915). In Bot. Jahrb. 54: 305 (1917) he describes them as *Toddaliopsis ebolowensis* and *Toddaliopsis heterophylla*, with no reference to his previous citations. I have not seen the specimens, and since the fruits are unknown it is impossible to say to which genus they belong.

Key to the genera of the African TODDALIEAE.

Fruit fleshy, of 4 united carpels, the carpels with a large concave pit on the inside of the upper half, 2-seeded; leaves very large, 5-foliolate; West Tropical Africa.....1. **Araliopsis.**
Fruit fleshy, of 1–7 united or 2–4 free carpels, carpels not pitted, 1-seeded; leaves 1–3-foliolate, very rarely 5-foliolate (*Oricia*) but then carpels free at maturity:
  Stamens or staminodes more than the number of the petals, usually twice as many; ovary 2- or more celled:
    Seeds with endosperm; fruit not warted; Tropical and South Africa, Mascarenes .....2. **Vepris.**
    Seeds without endosperm; fruit strongly warted; Zanzibar.....3. **Toddaliopsis.**
  Stamens or staminodes as many as the petals; ovary 1–7-celled:
    Carpels united or carpel solitary:
      Ovary 4–7-celled; scramblers, usually armed with prickles; South and Tropical East Africa, Mascarene Islands.....4. **Toddalia.**
      Ovary 1–2-celled; trees or shrubs; branches unarmed:
        Fruit and ovary 1-celled; South and Tropical Africa and the Mascarenes.....5. **Teclea.**
        Fruit and ovary 2-celled; West Tropical Africa 6. **Diphasia.**
    Carpels 2–4, more or less free, becoming quite free in fruit, or 1–3 aborting but evident; West Central and South Africa.....7. **Oricia.**

1. **Araliopsis** *Engl.* in Engl. & Prantl, Pflanzenf. 3, 4: 175 (1896).

Trees. *Leaves* large, leathery, 5-foliolate, gland-dotted. *Panicle* stout, spreading. *Flowers* 4-merous. *Fruit* fleshy, about 1 cm. in diameter, consisting of 4 united carpels; carpels with a large concave pit on the inside of the upper half, 2-seeded.

A. Soyauxii *Engl.* in Engl. & Prantl, Pflanzenf. 3, 4: 177, fig. 101 A'–D' (1896).

Trees with large thick leaves. *Petioles* stout, about 15 cm. long; leaflets oblong-obovate, rounded or shortly acuminate at the apex, cuneate at the base into a petiolule, 15–22 cm. long, 7–8 cm. broad; petiolule up to 2 cm. long. *Flowers* 4-merous; panicles

stout, spreading. *Fruit* fleshy, more or less globose, about 1 cm. in diameter, consisting of 4 united carpels; carpels with a large concave pit on the inside of the upper half, 2-seeded.

Tropical Africa. Gabon: Sibange Farm, Munda District, *Soyaux* 97.

2. **Vepris** *Comm.* ex *A. Juss.* in Mem. Mus. Par. 12: 509 (1825); Engl. & Prantl, Pflanzenf. 3, 4: 178 (1896).

Unarmed *shrubs* or *trees*. *Leaves* digitately 1–3-, rarely 2–4-foliolate, gland-dotted. *Flowers* unisexual, in terminal and axillary racemes, cymes or panicles. *Calyx* cup-shaped, 4-lobed. *Petals* 4. *Male flower*: stamens 8, usually 4 long and 4 short (in an Indian species, *V. bilocularis*, the calyx is 2-lobed, petals 2 and stamens 4); ovary rudimentary, 2–4-angled or with 2–4 styles. *Female flower*: staminodes 8; ovary 2–4-celled. *Fruit* 2–4-celled, sometimes 1 cell only developing and the others aborted, cells 1-seeded; endosperm present.

Widely distributed through South Africa, East Tropical Africa and the Mascarene Islands; also in India.

Excluded species:—*Vepris ? angolensis* Engl. = Clausena melioides *Hiern*.

Ovary 3–4-celled; rudimentary ovary with 4 styles:
- Stems and petioles pilose; Madagascar...(1) *V. schmidelioides*.
- Stems and petioles glabrous:
  - Leaves 3–4-foliolate:
    - Fruit 4-lobed; inflorescence a terminal panicle; leaflets lanceolate to elliptic, strongly undulate at the margins; South and East Africa, Mascarene Islands. (2) *V. lanceolata*.
    - Fruit 8-ribbed; inflorescence a terminal panicle; leaflets 2–4, obovate-elliptic, large and leathery, 13–16 cm. long, 6–8 cm. broad; Madagascar....(3) *V. macrophylla*.
    - Fruit not ribbed or lobed; inflorescence composed of axillary panicles; leaflets oblanceolate, 7–13 cm. long, 2.5–4 cm. broad; petioles and fruit drying black; East Africa.....(4) *V. Stolzii*.
  - Leaves unifoliolate:
    - Leaflets oblong-obovate, 10–14 cm. long, 3·5–6 cm. broad; fruits pointed and deeply pitted; Madagascar.....(5) *V. nitida*.
    - Leaflets obovate or oblong-cuneate, 4–5 cm. long and 1·5 cm. broad; Madagascar.....(6) *V. Elliotii*.

Ovary 2-celled; rudimentary ovary usually with 2 styles:
- Stems and petioles tomentose:
  - Leaflets about 7 cm. long; petioles winged; fruit pitted; Madagascar.....(7) *V. pilosa*.
  - Leaflets about 4 cm. long; fruit not seen:
    - Petioles winged; inflorescence of axillary and terminal panicles; Northern Rhodesia.....(8) *V. zambesiaca*.

Petioles terete; inflorescence of short axillary cymes; Tanganyika.....(9) *V. uguenensis*.

Stems and petioles glabrous:

Leaves usually 2–4-foliolate; leaflets elongate-oblanceolate, cuneate, up to 18 cm. long and 3 cm. broad; Madagascar (10) *V. densiflora*.

Leaves 1- or 3-foliolate; leaflets ovate to obovate up to 4 cm. long and 3 cm. broad:

Leaves 3-foliolate; leaflets obovate; panicles very short:

Gland-dots numerous and very conspicuous on the lower surface of leaflets; inflorescences axillary on the young branches; South Africa.....(11) *V. reflexa*.

Gland-dots inconspicuous on the under surface; inflorescences on the older growths; Portuguese East Africa.....(12) *V. Allenii*.

Leaves 1-foliolate:

Leaflets ovate, about 6 cm. long, with numerous prominent gland-dots; panicles long and drooping; East Africa .....(13) *V. eugeniifolia*.

Leaflets oblong or elliptic, up to 17 cm. long, gland-dots fine and not raised beneath; racemes more or less erect:

Petioles up to 3 cm. long; leaflets broadly elliptic and rather abruptly acuminate; East Africa (14) *V. ngamensis*.

Petioles short, about 1·2 cm. long; leaflets oblong-elliptic, gradually narrowing to the apex; Angola.....(15) *V. Gossweileri*.

(1) **V. schmidelioides** *Bkr.* in Journ. Linn. Soc. Bot. 20: 118 (1884).

Branches and petioles pilose; leaflets broadly elliptic, abruptly acuminate at the apex, cuneate at the base into a petiolule, 3–10 cm. long, 2–4 cm. broad, glabrous except on midrib. *Panicles* axillary; peduncles, pedicels and calyx softly pilose; calyx 4-lobed; petals 4. *Male flower*: stamens 8, 4 slightly shorter than the rest; rudimentary ovary with 4 styles. *Female flower* not seen. *Fruit* 4-celled, rough with raised glands.

MADAGASCAR. Central Madagascar, *Baron* 4336, 1282, 4308, 2212, 1102; *Bojer* 4 in Herb. Kew.

(2) **V. lanceolata** *G. Don* Gen. Syst. 1: 806 (1831). *Toddalia lanceolata* Lamk. Illustr. 2: 117 (1793). *V. querimbensis* Kl. in Peters Reise Mozamb. 87.

Branches and leaves glabrous; leaflets lanceolate to elliptic, narrowing gradually to the apex and base, sometimes rounded at apex and obovate, 4–10 cm. long and 1·2–3·5 cm. broad, strongly undulate on the margins. *Panicle* terminal, the branches subtrichotomous, puberulous to almost glabrous; flowers unisexual; calyx 4-lobed; petals 4. *Male flower*: stamens 8, with flattened

filaments, 4 very slightly shorter than the rest; rudimentary ovary with 4 styles. *Female flower*: staminodes obscure, ovary 4–8-lobed, 4-celled with 2 ovules in each cell; stigma sessile, peltate, 4-lobed. *Fruit* about the size of a pea, fleshy, 3–4-furrowed, 3–4-celled, with a single seed in each cell; embryo somewhat falcate, endosperm scanty; cotyledons oblong-linear, flat, obtuse, with a distinct constriction at the radicle; radicle shorter than cotyledons.

Widely distributed in South Africa from Knysna to the Kalahari, Portuguese East Africa, and in Mauritius and Reunion. The following specimens have been examined:—*Britten* 1979. *Balfour* (no number). *Bojer* (no number). *Bowie*. *Bowles* 46. *Burke* 77. *Burchell* 3125, 4670, 5489, 5285, 557A. *Borle* 592. *Commerson* (no number). *Davis* 103. *Dowling* 30. *Duthie* 28. *Ecklon* 1140. *Ecklon and Zeyher* 549, 949, 1140. *Flanagan* 121. *Fernando* in Herb. S. Afr. Forestry Department 1453. *Gerrard* 1784. *Hilner* 203. *Kirk* (no number). *Keet* in Herb. S. Afr. Forestry Department 3807. *Masson*. *McOwan* 147, 410. *Melliss* (no number). *Moggridge* 549. *Phillips* in Herb. S. Afr. Forestry Department 5500. *Paterson* 1911. *Pegler* 1287, 267. *Park* in Natal Govt. Herb. 2859. *Peters* (no number). *Rattray* 234. *Rudatis* 1492. *Rogers* 22473. *Sim* 2114. *Schlechter* 4710, 6234, 12008, 12164. *Wood* 150. *Zeyher* 350.

(3) **Vepris macrophylla** *Verdoorn*, comb. nov. *Toddalia macrophylla* Bkr. in Journ. Linn. Soc. Bot. 25: 303 (1889).

Leaves 3-foliolate on stout petioles; petioles 6–8 cm. long, rounded on the back and deeply grooved above; leaflets large and stout, obovate-elliptic, 13–16 cm. long, 6–8 cm. broad, petiolule 1–1·5 cm. long, grooved above. *Inflorescence* a terminal panicle. *Fruit* strongly 8-ridged, about 1·1 cm. in diameter.

MADAGASCAR. *Baron* 5488; Analamazaotra, *Thouvenot* 105.

(4) **Vepris Stolzii** *Verdoorn*, sp. nov.

Folia 3-foliolata, petiolo apice articulato, 2–5 cm. longo; *foliola* oblanceolata, 6–14 cm. longa, 2·3–4·5 cm. lata, acuminata, cuneata, breviter petiolulata; *inflorescentia* axillaris, paniculata; *fructus* nitidus, 4-locularis.

Leaves 3-foliolate; petioles 2–5 cm. long, persistent, black; leaflets oblanceolate, 6–14 cm. long, 2·3–4·5 cm. broad, acuminate, cuneate into a short black petiolule, jointed to the apex of the petiole, deciduous. *Inflorescence* an axillary panicle. *Fruit* 4-celled, smooth, globose, black, about 6 mm. in diameter.

TROPICAL AFRICA. Tanganyika Territory: *Stolz* 2646.

(5) **Vepris nitida** *Verdoorn*, comb. nov. *Toddalia nitida* Bkr. in Journ. Linn. Soc. Bot. 25: 303 (1889).

Leaves 1-foliolate; leaflets jointed to the petiole, oblong-obovate, 10–14 cm. long, 3·5–6 cm. broad; petiole 1–1·5 cm.

long. *Fruit* somewhat pointed at the apex, 1·1 cm. long, 0·6 cm. in diameter, pitted; 4-celled with 1 seed in each cell.
MADAGASCAR. *Baron* 3184.

(6) **Vepris Elliotii** *Verdoorn*, comb. nov. *Toddalia Elliotii* Radlk. in Journ. Linn. Soc. Bot. 29: 9 (1891).

Unarmed, glabrous, the young branches subtriangular, gland-dotted. *Leaves* sparse, 1-foliolate; leaflets obovate or oblong-cuneate, 4–5 cm. long, 1·5 cm. wide, obtuse or emarginate, margins revolute, articulated to the petiole, gland-dotted. *Flowers* shortly pedicelled in axillary and terminal racemes or small racemose panicles; buds globose; calyx small, obscurely 4-lobed; petals 4; stamens 8; ovary rudimentary, 4-celled, pyramid-shaped with a large dorsal gland.
MADAGASCAR. Fort Dauphin, *Scott-Elliot* 3087. (I have not been able to trace this specimen.)

(7) **Vepris pilosa** *Verdoorn*, comb. nov. *Toddalia pilosa* Bkr. in Journ. Linn. Soc. Bot. 21: 329 (1886).

Branches densely pilose. *Leaves* 3-foliolate; petioles 1–2·5 cm. long, flattened and winged especially towards the apex, pilose; leaflets oblanceolate-oblong, rounded or retuse at the apex, cuneate at the base into a very short petiolule, 4–8·5 cm. long and 1·5–1·8 cm. broad, midrib pilose, otherwise glabrous. *Flowers* not seen. *Fruit* in almost sessile, axillary clusters, black, strongly pitted, about the size of a pea, with 8 very small persistent staminodes.
MADAGASCAR. *Baron* 3093.

(8) **V. zambesiaca** *S. Moore* in Journ. Bot. 57: 86 (1919).

Young flowering *branches* short, pubescent. *Leaves* 3-foliolate; petioles narrowly winged, 1–2 cm. long, pubescent; leaflets oblong-ovate, 2·5–3 cm. long, 1·2–1·7 cm. broad, ovate, rounded or retuse at the apex, slightly narrowed at the base, sessile, softly pubescent on both surfaces. *Panicles* axillary and terminal, pubescent, about 2–3 cm. long; flowers pedicelled; pedicels slender, pubescent; calyx cupular, pubescent; petals 4, glabrous, much longer than the calyx; stamens 6–7; rudimentary ovary with a long grooved style. *Female flower* not seen.
TROPICAL AFRICA. N. Rhodesia: Livingstone, North Bank of Zambesi, *Rogers* 7486.

(9) **V. uguenensis** *Engl.* Bot. Jahrb. 36: 243 (1905).

Young *branches* tomentose. *Leaves* 3-foliolate; petioles terete, about 1 cm. long, tomentose; leaflets narrowly oblong or oblanceolate-oblong, rounded or retuse at the apex, somewhat cuneate at the base, about 5 cm. long and 1–1·5 cm. broad, pubescent on the midrib and conspicuously gland-dotted beneath. *Male inflorescence* of short axillary cymes; calyx small, cupular, tomentose; petals 4, exceeding the calyx, slightly pubescent dorsally;

stamens 8, 4 long and 4 short; rudimentary pistil with two styles. *Female flower* not seen.
TROPICAL AFRICA. Tanganyika: Ugueno, *Engler* 1652.

(10) **Vepris densiflora** *Verdoorn*, comb. nov. *Toddalia densiflora* Bkr. in Journ. Linn. Soc. Bot. 25: 303 (1889).

Branches glabrous. *Leaves* 2–4-foliolate; petioles glabrous, flattened, 2·5–4·5 cm. long; leaflets elongate-oblanceolate, 10–18 cm. long, 2·5–3·5 cm. broad, broad and rounded at the apex, cuneate at the base into a short petiolule. *Inflorescence* a lateral panicle, but flowers not seen. *Fruit* glabrous, pitted, more or less globose, about 7 mm. in diam., 2-celled, with 1 seed in each cell.
MADAGASCAR. *Baron* 3053.

(11) **Vepris reflexa** *Verdoorn*, sp. nov.

Folia 3-foliolata, foliolis plerumque dependentibus oblanceolatis basi cuneatis apice rotundatis 3–8 cm. longis 1·2–3·2 cm. latis; *inflorescentia* axillaris, floribus plus minusve glomeratis, perianthio 4-mero, staminibus 8; *ovarium* 2-loculare, stigmate late peltato; *fructus* 1-locularis et 1-spermus, loculo uno abortivo, globosus, demum oblique oblongus, basi attenuatus, circiter 1·5 cm. longus.

Branches glabrous. *Leaves* 3-foliolate; petiole 0·5–1·5 cm. long, rounded and somewhat grooved above; leaflets usually drooping, obovate or oblanceolate, cuneate at the base, narrowing slightly to the rounded apex, 3–8 cm. long, 1·2–3·2 cm. broad, almost sessile to shortly petioluled. *Inflorescence* axillary, shorter or a little longer than the petiole; flowers more or less in glomerules, the lateral sessile; calyx small, cupular, 4-lobed, lobes ciliate; petals 4, exceeding the calyx. *Male flower*: stamens 8, 4 long and 4 short, filaments filiform; rudimentary ovary usually with 2 styles, glabrous. *Female flower*: staminodes 8; ovary 2-celled, with 2 ovules in each cell; stigma broadly peltate. *Fruit* globose, becoming oblong, oblique and narrowed at the base, about 1·5 cm. long, 1-celled, the other cell reduced to a slit in the wall of the fruit, 1-seeded. *Seed* with scanty endosperm and foliaceous cotyledons.
SOUTH AFRICA. Transvaal: Pretoria, Babiaanspoort, *Verdoorn* in National Herb. 2995 (Type); Barberton, *Rogers* in Herb. Kew. 21422, and in Transvaal Mus. 18798. Natal: *Gerrard* 1787; Mooi River, *Wood* 990, 4460 in Herb. Kew; Tugela, *Evans* 661.
TROPICAL AFRICA. S. Rhodesia: Matopo Hills, *Rogers* 5252.

(12) **Vepris Allenii** *Verdoorn*, sp. nov.

Folia 3-foliolata, foliolis obovatis apice rotundatis basi cuneatis 3·5–8 cm. longis 1·75–3·5 cm. latis inconspicue glandulosis; *inflorescentia* breviter paniculata; *flores* longe pedicellati, perianthio 4-mero, staminibus 8.

Branches glabrous. *Leaves* 3-foliolate; petioles 1–2 cm. long,

grooved above and sometimes flattened; leaflets obovate, rounded at the apex, cuneate at the base, 3·5–8 cm. long, 1·75–3·5 cm. broad, with a very short or rather long petiolule, gland-dots not conspicuous. *Inflorescence* of small panicles on the stems and axillary in upper leaves; flowers long-pedicelled; calyx very small, 4-lobed; petals 4, much longer than the calyx; stamens 8; filaments flattened, all about the same length; ovary rudimentary with a 2-lobed pointed style. *Female flower* not seen.
TROPICAL AFRICA. Portuguese East Africa, *Allen* 68.

(13) **Vepris eugeniifolia** *Verdoorn*, comb. nov. *Toddalia simplicifolia* var. *eugeniifolia* Engl. Pflanzenwelt Ost-Afrikas, C: 228 (1895).

Branches glabrous. *Leaves* 1-foliolate; petioles 1–1·5 cm. long, rounded and grooved above; leaflets usually drooping, ovate, cuneate at the base, apex obtuse, 3·5–7·5 cm. long, 2–3·5 cm. broad, with numerous raised gland-dots beneath. *Inflorescence* axillary, usually longer than the petioles, the flowers in glomerules along the long drooping peduncle; calyx small, cup-shaped, very shallowly 4-lobed; petals 4. *Male flower*: stamens 8, 4 long and 4 short; rudimentary ovary glabrous, with 2 styles. *Female flower* and *fruits* not seen.
TROPICAL AFRICA. Tanganyika Territory: Usambara, *Holst* 8869. Kenya Colony: Kibwezi, *Scheffler* 217.

(14) **Vepris ngamensis** *Verdoorn*, comb. nov. *Teclea ngamensis* Engl. mss.

Folia 1-foliolata, petiolo 2–3 cm. longo; *foliola* late elliptica, apice abrupte acuminata, basi cuneata, punctis glandulosis numerosis notata; *racemi* axillares; *flores* pedicellati, staminibus 7; *ovarium* rudimentarium hirsutum; *fructus* non visus.

Branches glabrous. *Leaves* 1-foliolate; petioles 2–3 cm. long, slender, grooved above; leaflets broadly elliptic, about 14 cm. long and 6 cm. broad, rather abruptly acuminate, cuneate at the base, very finely gland-dotted beneath. *Racemes* axillary, more or less erect; flowers pedicelled. *Male flower*: calyx small, cupular, 4-lobed; petals 4, exceeding the calyx; stamens 7, 3 long and 4 short, rudimentary ovary hairy. *Female flower* and *fruit* not seen.
TROPICAL AFRICA. Tanganyika Territory: Amani, *Engler* 565.

(15) **Vepris Gossweileri** *Verdoorn*, sp. nov.

Folia 1-foliolata, petiolo 1 cm. longo; *foliola* lanceolato- vel oblongo-elliptica, apice rotundata vel longe acuminata, basi cuneata, punctis glandulosis numerosis inconspicuis notata; *inflorescentia* axillaris, racemosa, glabra; *ovarium* 2-loculare.

Branches glabrous. *Leaves* 1-foliolate; petioles about 1 cm. long, grooved; leaflets lanceolate- to oblong-elliptic, 12–16 cm. long and 3–5 cm. broad, rounded at the apex or long-acuminate, cuneate at the base, finely gland-dotted beneath. *Racemes* axillary,

glabrous, erect; calyx small, cupular, 4-lobed; ovary 2-celled. *Male flower* not seen. *Fruit* 2-celled with one cell aborted.
WEST AFRICA. Angola: Loanda; Cazengo, *Gossweiler* 4895.

3. **Toddaliopsis** *Engl.* in Engl. & Prantl, Pflanzenf. 3, 4: 179 (1896).

Shrubs. *Leaves* 3-foliolate, pellucid-dotted. *Leaflets* oblanceolate or obovate. *Flowers* unisexual. *Stamens* twice as many as the petals. *Ovary* of 4 united carpels; cells 2-ovuled. *Fruit* 4-celled, strongly warted; cells 1-seeded; seed without endosperm.

T. sansibarensis *Engl.* in Engl. & Prantl, Pflanzenf. 3, 4: 179 (1896).

Shrubs. *Leaves* 3-foliolate, pellucid-dotted; leaflets oblanceolate or obovate, acuminate to a blunt apex, cuneate at the base, 4–10 cm. long, 1·3–3·7 cm. broad. *Flowers* unisexual; calyx 4-lobed; petals 4. *Male flower*: stamens 8 with threadlike filaments; ovary rudimentary. *Female flower*: staminodes 8; ovary of 4 united carpels, cells 2-ovuled. *Fruit* 4-celled, strongly warted, about 1·2 cm. in diameter; cells 1-seeded; seeds without endosperm.
TROPICAL AFRICA. Zanzibar, *Hildebrandt* 1292; *Kirk* 4170.

4. **Toddalia** *Juss.* Gen. 371 (1789).

Woody *scramblers*. *Branches* usually armed, glabrous or rusty-pubescent. *Leaves* 3-foliolate, gland-dotted; leaflets slightly crenulate at the margins. *Inflorescence* of axillary and terminal panicles or cymes, rusty-pubescent. *Flowers* unisexual, 5-merous; stamens as many as the petals. *Ovary* 5–7-celled, with 2 ovules in each cell. *Fruit* about the size of a pea; 3–7-celled, with 1 seed in each cell.—Africa and Asia.

T. asiatica *Lamk.* Illustr. 2: 116 (1793). *T. aculeata* Pers. Synop. 1249 (1805).

A *scrambling shrub* usually armed with prickles, young branches often with a rusty indumentum. *Leaves* 3-foliolate; petiole 1–3·5 cm. long, grooved above, sometimes becoming flattened and the edges of the groove forming wings, often armed with prickles; leaflets sessile, elliptic, obovate and oblanceolate, about 2–7 cm. long and 1·2–2·5 cm. broad, rounded or shortly acuminate at the apex, cuneate at the base, margin crenulate, midrib sometimes spinous. *Inflorescence* of axillary and terminal panicles or cymes, with a rusty indumentum; flowers pedicelled; calyx small, with 5 acute lobes, corolla much longer than the calyx, lobes 5, linear, somewhat hooded at the apex. *Male flowers*: stamens 5; rudimentary ovary glabrous, about 5-lobed with a long 5-ridged style. *Female flowers*: staminodes 5; ovary 5–7-lobed with a short stout style and a flattened shallowly 3–5-lobed stigma, 5–7-celled with 2 ovules in each cell. *Fruit* about the size of a pea, 3–7-celled with 1 seed in each cell, stigma persisting for some time.

SOUTH AFRICA. Transvaal: Zoutpansberg, *Pole Evans* in Govt. Herb. No. 17686; Spelonken, *Doidge* in Govt. Herb. 6585; Pietersburg, *Rogers* 18119; Sibasa, *Junod* in Trans. Mus. 21194. TROPICAL AFRICA. Rhodesia: Chipete Forest Patch, *Swynnerton* 213. Nyasaland: Shiré Highlands, *Buchanan* 171, 575; Namasi, *Cameron* (no number). Tanganyika: *Stolz* 2413; Usambara, *Buchwald* 317; *Scheffler* 716. Kenya: *Fries* 477A; Nairobi, *Dummer* 1609; Mororo, *Moon* 410; Moranga, *Volkens* 1698; Limuru, *Snowden* 633; without locality, *Thomas* 41. Uganda: *Snowden* 174; *Ussher* 37; *Fyffe* 8. Sudan: *Sillitoe* 282. MASCARENE ISLANDS. Mauritius: *Graham* (without no.); *Ayres* (without no.); *Bojer* (without no.). Bourbon: *Burchell* (without no.). Madagascar: *Baron* 5643, 1157, 2452, 1192, 1950, 1451, 3103, 3933, *Humblot* 2389.

Also in tropical Asia.

5. **Teclea** *Delile* in Ann. Sci. Nat. Ser. 2, 20: 90 (1843).

Unarmed *shrubs* or *trees*. *Leaves* 1–3-foliolate, pellucid-dotted. *Inflorescence* of terminal or axillary panicles or axillary racemes, cymes or spikes. *Flowers* polygamous. *Calyx* cup-shaped, 4–5-lobed, rarely 3-lobed. *Petals* 4–5. *Stamens* or *staminodes* as many as the petals. *Ovary* small and rudimentary with 1 style, in the female globose, with a broad peltate stigma, 1-celled with 2 ovules. *Fruit* fleshy, 1-celled and 1-seeded.—South and Tropical Africa, Comoro Islands and Madagascar.

Leaves 1-, 2- and 3-foliolate on the same plant, the leaflets usually drooping and folding along the midrib; whole plant glabrous; South Africa.....(1) *T. natalensis*.

Leaves constantly 3-foliolate, rarely reduced to 1 leaflet on the same plant but then leaflets not drooping and folding; stems, petioles or inflorescence often hairy:

Inflorescence composed of short axillary and sometimes terminal racemes or cymes; buds usually ellipsoid:

Stems and petioles very obviously pubescent; flowers sessile or subsessile:

Leaflets narrowing at the apex, glabrous except on the nerves; East Tropical Africa:

Petals setulose-pubescent; leaflets with entire margins.....(2) *T. trichocarpa*.

Petals glabrous; leaflets with obscurely crenulate margins.....(3) *T. Fischeri*.

Leaflets rounded at the apex, hairy on both surfaces, margins entire; petals glabrous; Belgian Congo. (4) *T. Engleriana*.

Stems and petioles glabrous or stems sometimes obscurely hairy; flowers usually pedicelled:

Leaflets oblanceolate, long-cuneate at the base, large, the middle one up to 17·5 cm. long, with finely and very obviously undulate margins; Comoro Islands. (5) *T. johannensis*.

Leaflets up to 12 cm. long with not very obviously and finely undulate margins:

Median leaflet appreciably larger than the lateral, abruptly acuminate:

Apices of leaflets shortly and bluntly acuminate; petiole winged; flowers few and lax; East Tropical Africa.....(6) *T. angustialata*.

Apices of the leaflets long-acuminate; petiole not winged; West Tropical Africa.....(7) *T. Afzelii*.

Leaflets almost of equal size, rounded or gradually acuminate:

Petiole grooved and flattened; leaflets sessile, finely dotted beneath; South Africa...(8) *T. Gerrardii*.

Petiole terete, faintly grooved; leaflets petioluled with large conspicuous dots beneath; Cameroons. (9) *T. campestris*.

Inflorescence of terminal or axillary panicles; buds small, globose:

Leaflets hairy on both surfaces:

Leaflets more or less rounded at the base; petioles obviously winged; East Africa.....(10) *T. glomerata*.

Leaflets cuneate at the base, petioles very narrowly winged; East Africa.....(11) *T. pilosa*.

Leaflets glabrous except sometimes on the midrib:

Leaflets at most obtusely pointed, scarcely acuminate, broadly obovate, emarginate; the margins crenate; East Tropical Africa.....(12) *T. crenulata*.

Leaflets distinctly acuminate, or if some rounded then oblanceolate: margins not crenate:

Inflorescence axillary; some flowers long-pedicelled; glands not raised on the upper surface of the leaflets; petioles grooved and more or less flattened; fruits ovate in outline, strongly pitted; West Tropical Africa.....(13) *T. grandifolia*.

Inflorescence terminal and axillary; flowers all sessile or subsessile; petiole subterete, obscurely grooved above; fruits not strongly pitted:

Leaflets oblong-elliptic, rather shortly narrowed at the base and somewhat acuminate at the apex; glands numerous and raised on the upper surface:

Fruit obliquely lanceolate; calyx not ciliolate; acumen of leaflets long and narrow, linear lanceolate; Cameroons.....(14) *T. Zenkeri*.

Fruit ellipsoid-ovoid; calyx evidently ciliolate; acumen of leaflets broad, narrowing to a blunt apex, ovate-lanceolate; Angola and Rhodesia. (15) *T. Welwitschii*.

Leaflets lanceolate, gradually narrowed to each end, glands rarely conspicuous on upper surface; fruits ellipsoid-globose; Rhodesia and throughout East Tropical Africa to Abyssinia.....(16) *T. nobilis*.

Leaves constantly 1-foliolate:

Flowers on long slender pedicels; leaflets broadly elliptic and abruptly acuminate into a short broad acumen: Tanganyika Territory.....(17) *T. amaniensis*.

Flowers sessile or subsessile; leaflets gradually acuminate or rounded at the apex:

Branches of the panicles long, weak and drooping; leaflets large, 12–17 cm. long, 4–6 cm. broad; Angola. (18) *T. Gossweileri*.

Branches of the panicles erect if somewhat long; leaflets about 5–12 cm. long:

Leaves long-acuminate, acute at the base, petioles rather slender; glands not visible on the lower surface; lateral nerves rather few and distinct from the secondary nerves; pulvinus with the joint about the middle; Comoro Islands.....(19) *T. unifoliolata*.

Leaves slightly acuminate, acute or subacute at the base; petioles rather short; glands numerous, large and very conspicuous on the lower surface; lateral nerves numerous and scarcely different from the secondary; pulvinus with the joint about the middle; Madagascar.....(20) *T. punctata*.

Leaves not acuminate, obtuse at the apex, acute at the base; petioles rather short; glands small and scarcely visible on the lower surface; lateral nerves numerous and not sharply distinguished from the secondary ones; pulvinus with the joint at the base; inflorescence mostly paniculate at the end of the branches; Tanganyika Territory.....(21) *T. simplicifolia*.

Leaves slightly acuminate, acute or rounded at the base; petioles short; glands small and inconspicuous, rather scattered; lateral nerves few and distinct from the secondary ones; pulvinus with the joint at the base; inflorescence axillary; Kenya Colony. (22) *T. viridis*.

(1) **T. natalensis** *Engl.* in Engl. & Prantl, Pflanzenf. 3, 4: 183 (1896). *Toddalia natalensis* Sond. in Harv. & Sond. Fl. Cap. 1 : 447 (1860).

A glabrous *shrub*. *Leaves* usually digitately 3-foliolate, sometimes 1-foliolate with a distinct joint between petiole and leaflet; petiole terete but grooved on the upper surface, 0·5–2·5 cm. long;

leaflets oblong-lanceolate, 4–10 cm. long and 1·5–4 cm. broad, narrowing somewhat to the blunt apex, cuneate at the base, usually dark green shining, drooping and folding along the midrib. *Inflorescence* of axillary racemes or sometimes panicles, rarely also terminal; flowers unisexual, sessile, usually grouped in threes; calyx small, cup-shaped, 4-lobed; petals 4, much longer than the calyx. *Male flower*: stamens 4; ovary small and rudimentary, glabrous. *Female flower*: staminodes 4, small; ovary black, glabrous, 1-celled; stigma peltate, style very short. *Fruit* 1-celled, 1-seeded.
South Africa. Albany Distr.: *Bowker* (without no.), *Bowie* (without no.); Keiskama Hoek, *Stayner* 97; Blaauw Kranz, *Burchell* 3663; Bathurst, *Tyson* 13385; East London, *Munro* P.S. 80. Komgha, *Flanagan* 881. Natal, *Saunders* (without no.).

(2) **T. trichocarpa** *Engl.* Pflanzenw. Ost-Afr. C: 433 (1895). *Toddalia trichocarpa* Engl. Pflanzenw. Ost-Afr. C: 228 (1895). *Teclea Stuhlmannii* Engl. Bot. Jahrb. 54: 308 (1917).

Tree, the young branches and petioles pubescent with spreading hairs. *Leaves* 3-foliolate; petioles 1·5–4·5 cm. long, flattened, sometimes narrowly winged, pubescent; leaflets obovate- to oblanceolate-elliptic, 3–9 cm. long, 1·5–3 cm. broad, narrowing somewhat to the blunt apex or rounded, cuneate at the base, sessile (at least the lateral), the median larger than the two lateral, glabrous except on the midrib. *Inflorescence* of short axillary racemes; flowers unisexual, clustered, subsessile; buds globose becoming ellipsoid; calyx small, cupular, 4-lobed, ciliate; petals 4, much longer than the calyx, setulose-pubescent outside; stamens 4; rudimentary ovary densely pilose. *Female flowers* not seen. *Fruit* ellipsoid, 1·2 cm. long and 0·7 cm. broad, hairy.
Tropical Africa. Tanganyika: Usarama; Kigani, *Stuhlmann* 6467 (incorrectly quoted as 6427 in Engler's description). Kenya: Nairobi, *Battiscombe* 72; *Linton* 212; Kikuyu Berge, *Stuhlmann* 937; Nieri-forest, *Fries* 246. Uganda: Toro, *Bagshawe* 1203.

(3) **T. Fischeri** *Engl.* Pflanzenw. Afr. 3, 1: 756 (1915). *Toddalia Fischeri* Engl. Pflanzenw. Ost-Afr. C: 228 (1895).

Stems, petioles and veins shortly pubescent; petioles channelled above, 0·5–1·5 cm. long; leaflets 2·5–4.5 cm. long, oblong-elliptic, narrowing towards the blunt apex, cuneate at the base, glabrous except on the midrib, margins somewhat crenate. *Inflorescence* of axillary racemes shorter than the leaves, pubescent; flowers unisexual, sessile; buds small, almost globose; calyx cupular, shortly 4-lobed; petals 4; stamens 4; rudimentary ovary small. *Female flower* and *fruit* not seen.
Tropical Africa. Tanganyika Territory; Salanda, *Fischer* 142.

(4) **T. Engleriana** *De Wild.* in Ann. Mus. Congo Ser. 4: 76 (1902).

Tree, young branches pubescent. *Leaves* 3-foliolate; petioles winged, about 2–4·5 cm. long, hairy on both surfaces; leaflets

obovate-elliptic, about 3–5·7 cm. long and 1·5–3 cm. broad, rounded at the apex or slightly acute but not acuminate, cuneate at the base, the lateral leaflets smaller than the terminal and somewhat oblique at the base, hairy on both surfaces. *Inflorescence* of lateral and terminal racemes, the lateral ones much shorter than the petiole. *Male flowers* not seen. *Female flowers* very shortly pedicelled or subsessile; calyx cupular, shortly 4-lobed; petals 4, glabrous; staminodes none; ovary ovoid; style short with a large rounded stigma.
TROPICAL AFRICA. Belgian Congo: Lukafu, *Verdick* 142.

(5) **Teclea johannensis** *Verdoorn*, sp. nov.
Rami glabri; *folia* 3-foliolata; *foliola* oblanceolata, 9–17·5 cm. longa, basi longe cuneata, glabra, marginibus crebre undulatis; *racemi* breves, axillares, pubescentes; *flores* unisexuales, 4-meri, pedicellis longis; *alabastra* ellipsoidea; *ovarium* globosum, parce pilosum, 1-loculare, stylo crasso, stigmate late peltato.
Stems and *petioles* glabrous. *Leaves* 3-foliolate; petioles 2–4·5 cm. long, broadly channelled above; leaflets sessile, oblanceolate, 9–17·5 cm. long, narrowing somewhat towards the rounded apex and long-cuneate at the base, the lateral with the outer margins somewhat rounded, glabrous, the margins finely undulate. *Inflorescence* of short axillary pubescent racemes; flowers unisexual, long-pedicelled; buds ellipsoid; calyx small, 4-lobed; petals 4, much longer than the calyx; staminodes 4, small; ovary globose, thinly pilose, 1-celled; style evident, stout; stigma broadly peltate. *Male flower* and *fruit* not seen.
MASCARENE ISLANDS. Comoro Islands: Johanna, *Hildebrandt* 1668.

(6) **T. angustialata** *Engl.* Bot. Jahrb. 36: 245 (1905).
Stem and *petioles* glabrous. *Petioles* 1·5–3·5 cm. long, narrowly winged, wings broadening towards the apex; leaflets obovate, narrowed at the apex into a very short, broad, blunt acumen, shortly cuneate at the base, 5–10 cm. long, 2–4·5 cm. broad, the lateral appreciably smaller than the median, glabrous, the margins very slightly undulate. *Inflorescence* of short axillary pubescent racemes; flowers unisexual, pedicellate; buds ellipsoid; calyx small, 4-lobed; petals 4, much longer than the calyx; stamens 4; rudimentary ovary small with a straight style, pilose. *Female flower* and *fruit* not seen.
TROPICAL AFRICA. Tanganyika Territory: Usambara; Derema, *Scheffler* 129. Uganda: Toro, *Bagshawe* 1206.

(7) **T. Afzelii** *Engl.* Bot. Jahrb. 23: 153 (1897).
Stem and *petioles* glabrous. *Petioles* 1·5–2·5 cm. long, semiterete, grooved above; leaflets up to 12 cm. long and 3 cm. broad, oblanceolate, cuneate at the base into a petiolule and long-acuminate at the apex, glabrous, lateral nerves numerous and close together, lower surface gland-dotted. *Inflorescence* of short axillary racemes;

flowers not seen. *Fruit* pedicelled, obovate in outline, 1·5 cm. long and 0·8 cm. broad, apex oblique, 1-celled and 1-ovuled.
TROPICAL AFRICA. Sierra Leone: without locality, *Afzelius*.

(8) **Teclea Gerrardii** *Verdoorn*, sp. nov.

Rami glabri vel apices versus parce pubescentes; *foliola* oblanceolato-elliptica; *inflorescentia* racemoso-cymosa, axillaris, brevis, pubescens; *flores* unisexuales, pedicellati, 4-meri; *alabastra* ellipsoidea; *stamina* petala aequantia; *ovarium* pilosum, 1-loculare, ovulis 2, stylo breve, stigmate late peltato; *fructus* 1·5 cm. longus, 1 cm. latus, pilosus, monospermus.

Stem and *petioles* glabrous, sometimes obscurely hairy near the apex or in the groove of the petiole. *Petioles* 1–2·5 cm. long, broadly grooved, sometimes flattened and slightly winged, rarely somewhat pilose at the apex; leaflets oblanceolate- to obovate-elliptic, 4–9 cm. long, 1·5–3 cm. broad, narrowing slightly to the rounded apex, cuneate at the base. *Inflorescence* of short axillary cymose racemes, pubescent; flowers unisexual, pedicelled; buds ellipsoid; calyx small, 4-lobed; petals 4, much longer than the calyx. *Male flower*: stamens 4; ovary rudimentary, pilose. *Female flower*: staminodes 4; ovary globose, pilose, 1-celled, with 2 ovules; style short but evident; stigma broadly peltate. *Fruit* 1·5 cm. long, 1 cm. broad, thinly pilose, 1-seeded.
SOUTH AFRICA. Natal; *Gerrard* 1514 (Type), *Sanderson* 921. *Saunders* 1881, *Oliver* 4. Lusikisiki, *Miller* in For. Dept. Herb. 5172 and 4407.

(9) **T. campestris** *Engl.* Bot. Jahrb. 54: 307 (1917).

Stems and *petioles* glabrous. *Petioles* 1·5–3 cm. long, terete, faintly grooved above; leaflets oblanceolate-elliptic, about 9 cm. long and 2 cm. broad, cuneate at the base into a distinct petiolule, gradually acuminate to a blunt apex, the lower surface dotted with large conspicuous gland-dots. *Inflorescence* an axillary raceme. *Flowers* very young. *Fruit* not seen.
TROPICAL AFRICA. North Cameroons: Kalgey, *Ledermann* 5184.

(10) **Teclea glomerata** *Verdoorn*, comb. nov. *Toddalia glomerata* F. Hoffm. Beitr. Kenntn. Flora von Central Ost-Afr. 18 (1889). *Vepris glomerata* Engl. in Engl. & Prantl, Pflanzenf. 3, 4: 178 (1896).

Stems glabrous, but tips of young branches white-tomentose. *Petioles* 2–4·5 cm. long, flattened and winged, the wing broadening towards the apex, tomentose; leaflets ovate or obovate-oblong, rounded or slightly narrowing towards the blunt apex, broadly cuneate or rounded at the base, 2·5–5·5 cm. long, 1–2 cm. broad, sessile, margin entire, softly white-pubescent. *Panicles* glomerate, sessile, terminal on shortened lateral branches, tomentose; flowers unisexual, sessile, very small, globose; calyx 4-toothed; corolla closed; stamens 4–5.
TROPICAL AFRICA. Nyasaland: Kakoma, *Bohm-Reichard* 3A.

(11) **Teclea pilosa** *Verdoorn*, comb. nov. *Toddalia pilosa* Engl. Pflanzenw. Ost-Afr. C: 228 (1895), non Baker. *Vepris pilosa* Engl. Pflanzenw. Afrikas 3, 1: 754 (1915).

Stems softly pubescent. *Petioles* 1–2 cm. long, flattened and very narrowly winged, pubescent; leaflets obovate-oblong, rounded at the apex or broadly acuminate, narrowly cuneate at the base, 2–5 cm. long, 1–2·5 cm. broad, sessile or subsessile, softly pubescent, margin obscurely crenate. *Inflorescence* a panicle; calyx glabrous, cupular, obscurely 4-lobed; petals oblong. *Fruit* ellipsoid-globose, 7 mm. long and 5 mm. broad, glabrescent, brown.
Tropical Africa. Kenya Colony: Kibwesi, *Scheffler* 107.

(12) **T. crenulata** *Engl.* in Pflanzenw. Ost-Afr. C: 433 (1895). *Toddalia crenulata* Engl. in Pflanzenw. Ost-Afr. C: 228 (1895).

Stem shortly pubescent. *Petioles* about 2–3 cm. long, over half as long as the lateral leaflets, flattened, narrowly winged and shortly pubescent; leaflets obovate-oblong, the middle one larger than the lateral, cuneate at the base, rounded and retuse at the apex, sessile, margin crenulate, glabrous except on the midrib. *Panicles* terminal, pubescent; flowers not seen. *Fruit* ellipsoid, about 1·2 cm. long and 0·8 cm. broad, fleshy, 1-celled.
Tropical Africa. Portuguese East Africa: Pugurimi, Quilimane, *Stuhlmann* in Mus. Bot. Hamburg 562.

(13) **T. grandifolia** *Engl.* Bot. Jahrb. 23: 153 (1897).

Stem and *petioles* glabrous. *Petioles* 2–4·5 cm. long, grooved above and often flattened; leaflets elliptic-oblong, narrowing towards the apex and abruptly acuminate into a long narrow acumen, cuneate at the base, 7–19 cm. long, 2·5–7 cm. broad, rather papery, glabrous, lateral nerves prominent beneath, about 1 cm. or more apart. *Inflorescence* of axillary panicles, pubescent; flowers unisexual; buds globose; calyx cupular, 4-lobed; petals 4. *Male flower*: stamens 4. *Female flower*: ovary globose, glabrous or thinly pilose, 1-celled; style evident, stigma large, flattened, peltate.
Tropical Africa. Cameroons: Johann-Albrechtshöhe, *Staudt* 472, 493: S. E. Kunde, *Mildbraed* 9234. Sierra Leone: Sugar Loaf Mt., *Barter* (without no.).

(14) **T. Zenkeri** *Engl.* Bot. Jahrb. 32: 120 (1903).

Stem and *petioles* glabrous. *Petioles* 3–4 cm. long, subterete; leaflets elliptic-oblong, 10–16 cm. long, 3·5–5·5 cm. broad, abruptly acuminate at the apex into a long narrow acumen, cuneate at the base into a petiolule, glabrous, a few glands sometimes evident or raised above. *Panicles* terminal and axillary in the upper leaves, branching, pubescent; flowers unisexual. *Male flowers* small, clustered, sessile; buds globose; calyx 4-lobed; petals 4; stamens 4; ovary rudimentary. *Female flower* not seen. *Fruit* narrowing and curving towards the apex, about 1·2 cm. long, 0·5 cm. broad.

TROPICAL AFRICA. Cameroons: Sanaga, *Zenker* 1455; Johann-Albrechtshöhe, *Staudt* 590.

(15) **Teclea Welwitschii** *Verdoorn*, comb. nov. *Zanthoxylon Welwitschii* Hiern in Cat. Afr. Pl. Welw. 1: 114 (1896).

Stems glabrous. *Leaves* 3-foliolate; petioles terete, very slightly grooved above near the apex, 2–5 cm. long, glabrous; leaflets elliptic-oblong, broadly acuminate, cuneate at the base into a long or short petiolule, 7–20 cm. long, 2–7 cm. broad, glabrous, the glands numerous and raised on the upper surface. *Inflorescence* axillary and terminal; peduncle stout and usually elongating, not much branched; flowers glomerate, polygamous, sessile; buds globose; calyx cup-shaped, shallowly 4-lobed, ciliate; petals 4; stamens 4; ovary globose, glabrous, with a short style and peltate stigma, 1-celled. *Fruit* small, ovoid, 0·7 cm. long and 0·5 cm. broad.

TROPICAL AFRICA. Rhodesia: Chimanimani Mts., *Swynnerton* 1322. Angola: Golungo Alto; Serra de Alto Queta, *Welwitsch* 4554, 4555 and 4556; Cazenga, *Gossweiler* 4799, 5344; Granja Dist., *Gossweiler* 5229, 5767, 6329.

(16) **T. nobilis** *Delile* in Ann. Sci. Nat. Ser. 2, 20: 90 (1884). *Toddalia nobilis* Hook. f. in Oliv. Fl. Trop. Afr. 1: 306 (1868).

Stems glabrous or sometimes shortly pubescent. *Leaves* 3-foliolate; petioles subterete, scarcely grooved above, 2–5 cm. long, usually glabrous; leaflets elliptic-lanceolate, 7–18 cm. long, 2–4·5 cm. broad, narrowing towards the rounded or acute apex, cuneate at the base into a petiolule, glabrous, dull green, rather leathery, glands very seldom evident on the upper surface. *Panicles* axillary and terminal, branching, pubescent or glabrescent; flowers polygamous, sessile; buds globose; calyx 4-lobed or toothed, petals 4; stamens or staminodes 4; ovary rudimentary, glabrous; pointed, or in female flowers sub-globose, glabrous with a short style and flattened peltate stigma, 1-celled. *Fruit* ovoid, 7 cm. long and 5 cm. broad, 1-celled and 1-seeded.

TROPICAL AFRICA. Rhodesia: Chirinda, *Swynnerton* 2163. Nyasaland: no locality, *Buchanan* 892. Tanganyika: Kyimbila District, *Stolz* 1586. Kenya Colony: Eldama, *Whyte* (without no.); no locality, *Elliot* 377 and 247. Uganda: Entebbe, *Dawe* 7 and 479; Kipaya, *Dummer* 496; no locality, *Dummer* 298; Toro, *Bagshawe* 1200, 1153, 1084; Malema, *Bagshawe* 250; Chusazi, *Bagshawe* 110; Mabira, *Ussher* 43 and 90; Lugamba, *Scott-Elliot* 7140. Abyssinia: Wogera, *Schimper* 1293; Insaba, *Beccari* 58. Eritrea: Hamasen, *Pappi* 271; Acrour, *Schweinfurth and Riva* 729 and 113. Sudan: Dukuttu, *Schweinfurth* 2734; Missu, *Schweinfurth* 2786.

(17) **T. amaniensis** *Engl.* Bot. Jahrb. 36: 244 (1905).

Stem glabrous. *Leaves* 1-foliolate; petioles 1–3 cm. long, terete, pulvinate, jointed and knee-bent at the apex; leaflet broadly elliptic, about 15 cm. long and 7 cm. broad, abruptly

narrowed into a short broad acumen, shortly cuneate; glands not evident on upper surface but finely dotted on the lower; lateral nerves distinct from the secondary on the lower surface, about 10 on each side of the midrib. *Male flowers* on long slender pedicels and arranged in loose panicles; calyx small, cupular, 4-lobed; petals 4, longer than the calyx; stamens 4; rudimentary ovary hairy. *Female flowers* and *fruit* not seen.
TROPICAL AFRICA. Tanganyika Territory: Amani, *Warnecke* in Herb. Amani 516K.

(18) **Teclea Gossweileri** *Verdoorn*, sp. nov.

Folia 1-foliolata, petiolis 1·5–3·5 cm. longis; *foliola* oblongo-elliptica, apice acuminata, basi cuneata, punctis glandulosis numerosis inconspicuis notata; *inflorescentia* axillaris; *pedunculi* longi; *flores* glomerati, sessiles; *stamina* 4.

Stem glabrous. *Leaves* 1-foliolate; petioles 1·5–3·5 cm. long, strongly grooved and somewhat flattened, slightly pulvinate and jointed at the apex; leaflet oblong-elliptic, about 14 cm. long and 5 cm. broad, rather acuminate at the apex and cuneate at the base, gland-dots numerous and fine but not very evident; lateral nerves numerous and not very distinct from the secondary. *Male flowers* sessile and clustered on long weak axillary peduncles; calyx and corolla small; stamens 4; rudimentary ovary small, glabrous. *Female flower* and *fruit* not seen.
WEST AFRICA. Angola; *Gossweiler* 8328.

(19) **T. unifoliolata** *Baill.* in Bull. Soc. Linn. Paris i: 591 (1886). *Comoroa pisocarpa* Oliv. in Hook. Ic. Pl. t. 2408 (1895).

Stems glabrous. *Leaves* 1-foliolate; petioles fairly slender, about 1·5 cm. long, pulvinate at the apex, jointed in the middle of the pulvinus. Leaflet oblong-lanceolate, fairly long-acuminate at the apex, cuneate at the base, about 12 cm. long and 4 cm. broad, glabrous, lateral nerves rather few and distinct from the secondary nerves, glands not visible on the lower surface. *Inflorescence* of axillary spikes or racemes; flowers unisexual; buds ellipsoid; calyx 4-lobed; petals 4, much longer than the calyx; stamens 4; rudimentary ovary small, glabrous, conical. *Female flower* not seen. *Fruit* subglobose, 1-seeded, about 5 mm. in diam.
MASCARENE ISLANDS: Comoro; *Humblot* 364, 1324. Great Comoro, *Kirk*.

(20) **Teclea punctata** *Verdoorn*, sp. nov.

Folia 1-foliolata, petiolo apice pulvinato circiter medium pulvini articulato; *foliola* ovata vel obovato-oblonga, apice rotundata vel brevissime et sensim acuminata, basi late cuneata, punctis glandulosis magnis et conspicuis notata, nervis lateralibus numerosis; *inflorescentia* axillaris et terminalis, spicata vel spicato-paniculata, breviter pubescens.

Stems glabrous. *Leaves* 1-foliolate; petioles short, about 1 cm. long, somewhat flattened, pulvinate at the apex, jointed in the

middle of the pulvinus; leaflet ovate or obovate-oblong, rounded or very shortly and gradually acuminate at the apex, broadly cuneate at the base, about 8 cm. long, 3 cm. broad, glabrous, lateral nerves numerous and scarcely different from the secondary; glands numerous, large and very conspicuous on the lower surface. *Inflorescence* of axillary and terminal simple or branched spikes, shortly pubescent; calyx 4-toothed or lobed; petals 4, much longer than the calyx; stamens 4; ovary rudimentary. *Female flower* and *fruit* not seen.
MADAGASCAR. *Scott-Elliot* 3031.

(21) **Teclea simplicifolia** *Verdoorn*, comb. nov. *Toddalia simplicifolia* Engl. Pflanzenw. Ost-Afr. C: 228 (1895).

Stems glabrous. *Leaves* 1-foliolate, jointed almost at the base of the pulvinus; petiole short, fairly stout, 0·5-1 cm. long; leaflet ovate or obovate-oblong, rounded at the apex or sometimes slightly narrowing, cuneate at the base, 4–10 cm. long, 2–5 cm. broad, glabrous, lateral nerves numerous and not sharply distinguished from the secondary ones, glands small and scattered on the lower surface. *Inflorescence* usually paniculate at the ends of the branchlets, shortly pubescent; flowers unisexual, subsessile; calyx cup-shaped, 4-toothed or lobed; petals 4, much longer than the calyx; stamens 4; rudimentary ovary small and conical. *Female flowers* and *fruit* not seen.
TROPICAL AFRICA. Tanganyika Territory: Elancirob-Krater, *Jaeger* 510; Marangu, *Volkens* 1709A; Usambara District, *Holst* 3801.

(22) **Teclea viridis** *Verdoorn*, sp. nov.

Folia 1-foliolata, petiolo apice pulvinato circiter basi pulvini articulato; *foliola* ovato-oblonga, apice rotundata vel leviter angustata, basi cuneata, glabra, punctis glandulosis parvis et inconspicuis laxe dispositis notata, nervis lateralibus paucis; *inflorescentia* axillaris, spicata vel subracemosa, pubescens.

Stems glabrous. *Leaves* 1-foliolate; petiole short, stout, 0·5–1 cm. long, pulvinate at the apex and jointed more or less at the base of the pulvinus; *leaflet* ovate-oblong, rounded or slightly narrowing towards the apex, cuneate at the base, 5–12 cm. long, 2–4·5 cm. broad, glabrous, lateral nerves on the under surface few and distinct from the secondary, glands small, inconspicuous, rather scattered. *Inflorescence* of 1 or more axillary spikes or racemes, pubescent; flowers unisexual; calyx cupular, 4-toothed or lobed; petals 4, much longer than the calyx. *Male flower*: stamens 4; ovary rudimentary. *Female flower*: staminodes 4; ovary globose with a broad sessile peltate stigma. *Fruit* globose, about 0·7 cm. in diameter, smooth.
TROPICAL AFRICA. Kenya Colony: Nairobi, *Dowson* 387, *Battiscombe* 933 and 867 (Type); Kerura, *Battiscombe* 937; Mt. Kenia, *Fries* 1100A. No locality, *Elliot* 282 and 155.

6. **Diphasia** *Pierre* in Bull. Soc. Linn. Par. n. ser., 70 (1898).

Small *trees*, unarmed. *Leaves* digitately 3-foliolate, glandular-punctate. *Inflorescence* of terminal and axillary panicles. *Flowers* polygamous. *Calyx* with 4 shallow rounded lobes. *Petals* 4. *Stamens* 4. *Disc* with long stiff yellow hairs. *Ovary* glabrous or sparingly hispid, formed of 2 carpels united entirely and with a very short style and peltate stigma. *Ovules* 2. *Fruit* 2-lobed or of 1 oblique carpel, the other carpel aborting and forming a lobe at the base, about 1 cm. long. *Seed* solitary in each carpel.—West Tropical Africa.

Diphasia angolensis *Verdoorn*, comb. nov. *Cranzia angolensis* Hiern Cat. Afr. Pl. Welw. 1: 115 (1896). *Diphasia Klaineana* Pierre in Bull. Soc. Linn. Par. n. ser., 68 (1898).

A small *tree*, unarmed, young branches hispid with yellow or gray hairs. *Leaves* 3-foliolate; petiole hispid-tomentose, 2–8 cm. long, usually somewhat flattened; leaflets elliptic-obovate, acuminate at the apex, cuneate at the base into a petiolule, 5–18 cm. long, 2·3–7 cm. broad, glabrous above except on the midrib and sparingly hairy beneath, margin entire; petiolule hispid, 2–10 mm. long. *Inflorescence* of terminal and axillary panicles; peduncles yellow-hispid-tomentose, flattened; calyx 4-lobed, lobes shallow and rounded; petals 4, much longer than the calyx; stamens 4; disc annular, hispid with long yellow hairs; ovary glabrous or sparingly hispid, formed of 2 entirely united carpels ending in a single short style and a peltate stigma; ovules 2 in each carpel. *Fruit* about 1 cm. long, brownish, glabrous or sparingly hairy, covered with raised dots, 2-lobed or of one oblique carpel, the other aborting and forming a swelling at the base of the fruit.
Tropical Africa. Gabon: *Klaine* 2592, 753, 3221, 3190. Angola: Golungo Alto, *Welwitsch* 4552, 4553.—*Dummer* 722 from Uganda may belong here. The flowers, which are rather young, are subsessile instead of pedicelled as in the above.

7. **Oricia** *Pierre* in Bull. Soc. Linn. Paris 2: 1288 (1897).

Trees. *Leaves* digitately 3–5-foliolate, gland-dotted, often very large. *Inflorescence* of axillary and terminal racemes or panicles, the subtending leaves in some species very much reduced; peduncles flattened and tomentose. *Flowers* polygamous. *Calyx* 4-lobed. *Petals* 4, much longer than the calyx. *Stamens* or staminodes 4. *Ovary* hispid, of 2–4 carpels somewhat cohering at the base, otherwise free; styles very short, sometimes cohering, ending in a fused peltate stigma; stigma obscurely 2–4-lobed; ovules 2 in each carpel. *Fruit* of 2–4 distinct carpels 1–3 of which are often aborted but persistent. *Seed* 1 in each carpel, without endosperm.—West Tropical Africa, Rhodesia to South Africa.

Carpels 4; lateral nerves on lower surface of the leaflets distinct from the secondary, about 6–20 on each side of the midrib:
Leaflets 5; Congo.....(1) *O. Lecomteana*.
Leaflets 3:

Inflorescence of axillary racemes; leaflets subsilvery beneath; West Tropical Africa.....(2) *O. Klaineana*.
Inflorescence of terminal and axillary panicles; leaflets not subsilvery beneath:
Branches and inflorescence woolly-tomentose; leaves at the base of the panicles much reduced, simple and densely tomentose; calyx enlarging and persisting in fruit; West Tropical Africa.....(3) *O. gabonensis*.
Branches and inflorescence shortly pubescent; leaves not reduced; calyx not enlarging; leaflets about 7–14 cm. long; West Tropical Africa.....(4) *O. suaveolens*.
Branches and inflorescence at most finely puberulous; leaves not reduced; calyx probably not enlarging; leaflets about 18–20 cm. long; Cameroons...(5) *O. trifoliolata*.
Carpels 2; lateral nerves numerous and close together:
Leaflets ovate or oblong-ovate, 7–15 cm. long, 3–7 cm. broad; pedicels glabrescent, long; Rhodesia.....(6) *O. Swynnertonii*.
Leaflets narrowly obovate, oblanceolate or elliptic, 6–10 cm. long, 2–3·5 cm. broad; pedicels hairy, short; South Africa:
Rudimentary ovary densely tomentose...(7) *O. transvaalensis*.
Rudimentary ovary thinly hairy.....(8) *O. Bachmannii*.

(1) **O. Lecomteana** *Pierre* in Bull. Soc. Linn. Paris, 2: 1289 (1897).

Branches and petioles pubescent; leaflets 5, almost sessile, obovate, the lateral ones lanceolate and acute, slightly undulate, at length almost glabrous, when young puberulous along the midrib, submembranous, 16–24 cm. long, 7–10 cm. broad, longer than the petiole, lateral nerves 12–14 pairs 1·3–2·4 cm. apart, somewhat raised below. Fruiting *racemes* 4–5 cm. long; branches 3, very short and pilose. *Carpels* 1–4, obtuse, pilose, 1·4 cm. long, 7–8 mm. broad, glandular-punctate, 1-seeded; seed without endosperm.

Tropical Africa. Belgian Congo: Niunvoux, *Lecomte* (n. 68).—Not seen by me.

(2) **O. Klaineana** *Pierre* in Bull. Soc. Linn. Paris, n. s. 68 (1898).

A small *tree*, branches and petioles pubescent. *Leaves* 3-foliolate; petioles 3–18 cm. long, terete; leaflets obovate, 7–21 cm. (rarely to 24 cm.) long, 4–10 cm. broad, shortly acuminate at the apex, bright and subsilvery beneath, lateral nerves about 12–20 on each side. *Racemes* axillary, mostly simple, tomentose, 3–6 cm. long; calyx pubescent, with 4 acuminate sepals; petals 4·5 mm. long, boat-shaped, pubescent; stamens in the female flower 1 mm. long with an oval acuminate anther; carpels entirely free, but stigmas fused, sessile, peltate, and 4-lobed.

Tropical Africa. Gabon: Libreville, *Klaine* 1303.

(3) **O. gabonensis** *Pierre* in Bull. Soc. Linn. Paris, 2: 1289 (1897).

Branches and petioles pubescent. *Leaves* 3-foliolate; petioles 3–16 cm. long, terete; leaflets broadly obovate, 10–23 cm. long,

5–11 cm. broad, shortly acuminate at the apex and cuneate at the base, glabrous or young leaflets pubescent on the nerves; lateral nerves prominent beneath, 10–15 on each side, 1–2 cm. apart. *Inflorescence* of axillary or terminal racemes or panicles, the subtending leaf often much reduced and densely pubescent; flowers on pubescent pedicels; calyx 4-lobed, tomentose, small; petals 4, much longer than the calyx; stamens 4, about as long as the petals, in female flowers sterile or sometimes reduced; filaments flattened; ovary tomentose, of 4 carpels somewhat cohering but separable, with a common peltate 4-lobed style; in male flowers carpels 4, abortive, with 4 free styles. *Fruit* of 4 free carpels, 1 or 3 rudimentary but persistent, tomentose, obliquely obovate, with 4 enlarged reflexed calyx-lobes persisting for some time; seed 1 in each carpel, without endosperm.
Tropical Africa. Gabon: Libreville, *Klaine* 444, 3206. Cameroons: *Zenker* 777.

(4) **Oricia suaveolens** *Verdoorn*, comb. nov. *Teclea suaveolens* Engl. Bot. Jahrb. 23: 152 (1897). *Oricia leonensis* Engl. Bot. Jahrb. 32: 120 (1903).

Branches and petioles pubescent. *Leaves* 3-foliolate; petioles 1–3·5 cm. long, terete and grooved above; leaflets broadly obovate-oblong, 6–14 cm. long and 2·5–8 cm. broad, the median appreciably larger than the lateral, rounded or slightly acuminate and retuse at the apex, cuneate at the base, the lateral somewhat oblique; lateral nerves distinct from the secondary, about 6 on each side of the midrib; midrib pubescent on the upper surface. *Inflorescence* of terminal panicles; peduncles pubescent; flowers sessile or subsessile, small, glabrous; calyx cupular, shortly 4-lobed; petals 4. *Male flower*: stamens 4; rudimentary ovary very small and densely covered with long shaggy hairs. *Female flower* not seen. *Fruit* of 2 free carpels with 1–2 rudimentary, persistent carpels at the base, pubescent especially at the base.
Tropical Africa. Sierra Leone: *Afzelius*, *Vohsen*; Sugar Loaf Mt., *Dalziel* 977. French Guinea: Kindia, *Chevalier* 13100.

(5) **Oricia trifoliolata** *Verdoorn*, comb. nov. *Araliopsis trifoliolata* Engl. Bot. Jahrb. 54: 304 (1917).

Branches and petioles puberulous. *Leaves* 3-foliolate; petioles 3–16 cm. long, somewhat compressed; leaflets elongate-oblong, 14–23 cm. long, about 7 cm. broad, shortly acuminate, cuneate at the base, lateral nerves distinct from the secondary and over 1 cm. apart. *Panicles* terminal and axillary, puberulous. *Female flower*: calyx small, cupular, 4-lobed; petals 4, much longer than the calyx, 2·5 mm. long, puberulous outside; staminodes 4; ovary of 4 carpels, separable but cohering, hairy all round. *Male flower* and *fruits* not seen.
Tropical Africa. Cameroons: Victoria, *Zahn* 499.

(6) **Oricia Swynnertonii** *Verdoorn*, comb. nov. *Teclea Swynnertonii* Bkr. f. in Journ. Linn. Soc. 40: 35, pl. 2, figs. 1–5 (1911).

Medium-sized *tree*; young branches and petioles fusco-pubescent. *Leaves* 3-foliolate; petioles 2–7 cm. long, subterete, fusco-pubescent; leaflets ovate or oblong-ovate, 7–15 cm. long, 3–7 cm. broad, broadly attenuated to the blunt apex, cuneate at the base into a petiolule, coriaceous; lateral nerves numerous, close together, glabrous except sometimes on the midrib; petiolule 0·5–1 cm. long. *Inflorescence* of axillary and terminal racemes and panicles, the flowers subglomerate, unisexual; peduncles flattened, tomentose; pedicels terete, glabrescent, usually longer than the flower; calyx small with 4 shallow, ciliate lobes; petals 4, much longer than the calyx. *Male flower*: stamens 4, as long as the petals, becoming much longer; filaments flattened; rudimentary ovary of 2 small carpels, long-hispid at the base, sometimes fused. *Female flower*: staminodes 4, small; ovary of 2 carpels close together and cohering at the base but growing quite apart with age; styles usually separate, very short; stigma fused, peltate, obscurely 2-lobed. *Fruit* fleshy, one carpel usually aborted but persistent; seed 1 in each carpel.

Tropical Africa. Rhodesia: Chirinda Forest, *Swynnerton* 12. Nyasaland: *Buchanan* 758.

(7) **Oricia transvaalensis** *Verdoorn*, sp. nov.

Arbor; *ramuli* petiolique pubescentes; *folia* 3-foliolata; *foliola* obovata vel oblanceolato-elliptica, apicem versus late acuminata, basi in petiolulum cuneata, costis exceptis glabra; nervi laterales numerosi; *inflorescentia* racemosa vel paniculata, axillaris et terminalis; *flores* unisexuales, subglomerati, 4-meri; *pedunculi* compressi, tomentosi; *pedicelli* breves, pubescentes; *ovarium* rudimentarium 2-merum, dense hispidum, tomentosum.

Tree: branches and petioles pubescent. *Leaves* 3-foliolate; petioles 1·5–6 cm. long, subterete, grooved above, pubescent; leaflets obovate or oblanceolate-elliptic, 6–10 cm. long, broadly acuminate at the apex, cuneate at the base into a petiolule, glabrous except on the midrib, lateral nerves numerous and close together; petiolule about 0·5 cm. long. *Inflorescence* of axillary and terminal racemes or panicles; flowers unisexual, subglomerate; peduncles flattened, tomentose; pedicels short, up to about as long as the flowers, hairy; calyx small, 4-lobed, hairy; petals 4, much longer than the calyx. *Male flower*: stamens 4, about as long as the petals, becoming longer; rudimentary ovary of 2 small carpels usually fused and densely hispid-tomentose. *Female flower* and *fruit* not seen.

South Africa. Transvaal: Potato Bosch, *Burtt Davy* 1163.

(8) **Oricia Bachmannii** *Verdoorn*, comb. nov. *Teclea Bachmannii* Engl. Bot. Jahrb. 23: 153 (1897).

Tree; branches and petioles pubescent. *Leaves* 3-foliolate; petioles 2–5 cm. long, subterete or shallowly grooved above, pubescent; leaflets obovate or oblanceolate-elliptic, 5–9 cm. long, 1·5–3 cm. broad, broadly acuminate at the apex, cuneate at the

base into a petiolule, glabrous except sometimes on the midrib; lateral nerves numerous, close together; petiolule 0·5–1 cm. long. *Inflorescence* of axillary and terminal racemes at the ends of the branches; peduncles flattened and tomentose; pedicels short, slender and pubescent; flowers unisexual, subglomerate; calyx small, 4-lobed, ciliate; petals 4, twice or more than twice as long as the calyx. *Male flower*: stamens 4; rudimentary ovary of 2 small carpels cohering at the base, thinly hirsute. *Female flower* not seen. *Fruit* of 2 carpels, one often aborted but persisting; carpel oblique, about 1·7 cm. long and 1·3 cm. broad, pubescent at least at the base, 1-seeded. *Seeds* without endosperm.

SOUTH AFRICA. Cape Province: Kentani, *Miss Pegler* 823. Pondoland: *Bachmann* 835.

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LI.—SESSÉ AND MOCIÑO'S PLANTAE NOVAE HISPANIAE AND FLORA MEXICANA. T. A. Sprague.

Martin Sessé, a Spanish physician and botanist, was appointed in 1787 Director of the Scientific Expedition of Nueva España (Mexico and Central America), and in the following year Director of the Botanic Garden, Mexico. During the period 1788–1795 he devoted much time to the examination and description of Mexican plants with the assistance of José Mariano Mociño, who was appointed Botanist of the Expedition in 1791, and made botanical collections in various parts of Mexico and Guatemala. Sessé and Mociño subsequently spent more than eight years, from 1795 to 1804, in more extensive travels through Mexico and Central America, North-west America, Cuba and Puerto Rico.

The botanical results of Sessé and Mociño's investigations and explorations consisted of a herbarium, a set of about 1,400 coloured drawings of Mexican plants, and various manuscripts including a "Flora de Guatemala" in addition to the two works which form the subject of the present note. Sessé and Mociño's herbarium was incorporated in 1820 in the general herbarium of the Madrid Botanic Garden, where their manuscripts are also preserved, but the large collection of original coloured drawings disappeared after Mociño's death in 1819 and its fate is still unknown. A set of their plants, which formed part of Lambert's herbarium, is now in the Herbier Delessert, and some Mexican plants in the Kew Herbarium and British Museum marked "Herb. Pavon" were apparently collected by Sessé and Mociño, and came into Ruiz and Pavon's hands after Mociño had fled from Spain.

The political troubles in Spain in the early part of the nineteenth century prevented the publication of Sessé and Mociño's works. Sessé had died in 1809, and Mociño was obliged to take asylum in Montpellier in 1813, taking with him the manuscripts and the collection of drawings. The latter were lent by Mociño to A. P. De Candolle, who formed a high opinion of their scientific value, and together with other botanists based 17 new genera and 271 new species on them in his Systema and Prodromus. When Mociño returned to Spain in 1817 he asked De Candolle, who had in the meantime moved to Geneva, to return the collection of drawings at very short notice. Mociño had previously given 305 duplicate drawings to De Candolle and 71 drawings had been copied for the latter while still at Montpellier. The remaining drawings were copied in 8–10 days by the combined efforts of about two hundred persons, 860 being copied completely and 109 in outline only. The whole collection was bound in several volumes, and is preserved in the Conservatoire Botanique at Geneva. Ten sets of tracings of the drawings on which new species and genera had been based were distributed in 1874 at cost price to the principal herbaria of the world by Alphonse de Candolle.

While the Sessé and Mociño plants now in the Herbier Delessert were in Lambert's herbarium a number of them were described by

David Don in Trans. Linn. Soc. xiv. 573–577 (1825); xvi. 169–303 (1833); and George Don, Gen. Syst. (1831–1838).

The appearance of the Botany of the Biologia Centrali-americana stimulated interest in Sessé and Mociño's works, and led to the publication in Mexico—after a lapse of nearly a century—of their "Plantae Novae Hispaniae" and "Flora Mexicana," both works being issued in instalments by the "Sociedad Mexicana de Historia Natural" as appendices to their periodical "La Naturaleza" (Ser. II. tom. 1–2) during the periods 1887–1890 and 1891–1897 respectively. Second editions were published in 1893 and 1894 respectively by the "Secretaría de Fomento," Mexico. It follows that nearly half the second edition of the "Flora Mexicana," namely from p. 125, *Myrtus racemosa*, to the end, appeared before the corresponding part of the first edition.

The two works contain descriptions of several hundred species regarded as new by Sessé and Mociño, and of many others which were identified by them—for the most part erroneously—with previously described species. No authorities are cited for the specific names, and it is often difficult to determine whether particular species were regarded as new by Sessé and Mociño, or were supposed by them to be identical with previously described species of the same name, with which they may or may not have been acquainted. The new names should in the normal course of events have been taken up for Durand and Jackson's Supplement to the Index Kewensis, but did not appear in that work. They have now been extracted for insertion in the seventh Supplement. Space does not permit of the publication here of the full list of species, but the following particulars regarding the nature and preparation of Sessé and Mociño's two floras are of more general interest, being essential to the understanding of the problems connected with these authors' species.

According to Ramirez, the "Flora Mexicana" embodies the results of Sessé and Mociño's earlier explorations, which finished in 1795, whereas the "Plantae Novae Hispaniae" was written later. These statements do not appear to be borne out either by the preface of the latter work or by internal evidence. Sessé and Mociño state that their "Plantae Novae Hispaniae" included the plants collected in three years of travel through Nueva España, and that, whilst they were engaged in its preparation, Ortega's edition of the works of Hernandez appeared. As the latter was published in 1790, it seems probable that the "Plantae Novae Hispaniae" embodies only the results of Sessé and Mociño's earlier investigations. The "Flora Mexicana," on the other hand, includes numerous species from Cuba and Puerto Rico, which islands, according to Colmeiro, were not visited by the authors until towards the end of their eight years of exploration from 1795 to 1804. Apparently the "Flora Mexicana," which bore no title in manuscript, was a collection of materials for a series of floras, commenced at an early date by Sessé and Mociño and added to from time to time during their travels. Cervantes in 1794 cited eight new species of *Jatropha* from the unpublished Flora

Mexicana, but singularly enough only one of these, *J. ciliata*, is included in the Flora Mexicana, and another, *J. triloba*, in the Plantae Novae Hispaniae, the remaining six being apparently unrepresented in these works.

Writing before the foundations of floristic plant-geography had been laid by Humboldt and Bonpland's researches, Sessé and Mociño seem to have had little hesitation in identifying indigenous Mexican plants with species from Europe, South Africa, Arabia, India, Malaya, China, and even New Zealand (*Gentiana saxosa*). Apart from a certain number of weeds and cultivated plants nearly all these identifications were erroneous. Apparently they were based on comparison of Mexican plants not with herbarium specimens but with descriptions and figures of Old-world species.

Some material collected during the later part of the Expedition seems to have been referred erroneously by the authors to species already described by them. Specimens belonging to these later collections were doubtless among those which passed into Pavon's hands and afterwards into Lambert's herbarium, where they were described by David and George Don. Thus *Mimosa hirsuta* Moc. et Sessé ex G. Don, Gen. Syst. ii. 383 is certainly not conspecific with *M. hirsuta* Sessé et Moc. Pl. Nov. Hisp. 165, as is evident from comparison of the two descriptions. Similarly *Phaseolus pauciflorus* Sessé et Moc. ex G. Don was evidently not based on the original material described by Sessé and Mociño, for these authors describe the stem as glabrous whereas, according to Don, it is villous. On the other hand certain discrepancies which are observable between De Candolle's descriptions and those of Sessé and Mociño, seem to be due to inaccurate observation on the part of the latter authors, as in the case of *Mimosa esculenta* (*Leucaena esculenta* Benth.), which they described as polyandrous, whereas it is decandrous.

In the interpretation of Sessé and Mociño's descriptions the herbarium specimens at the Madrid Botanic Garden and the drawings at the Conservatoire Botanique at Geneva are of primary importance, whereas the dried specimens in the Herbier Delessert now at the latter institution, and those marked "Herb. Pavon" at Kew and the British Museum are not equally well authenticated. They may in some instances be duplicates of the original specimens described by Sessé and Mociño, but in other cases, e.g. *Mimosa hirsuta*, they were evidently collected at a later date.

Contemporary and subsequent authors published many species bearing the same names as those described in manuscript by Sessé and Mociño. In some cases these are conspecific, in others not. *Zinnia elegans* Sessé et Moc. may be identical with *Z. elegans* Jacq. Coll. Suppl. 152 (1796), seeds of which were received by Jacquin under that name, probably from the Madrid Botanic Garden. Similarly *Coreopsis artemisiaefolia* Jacq. (1796), *Helianthus trilobatus* Link (1822), and *Cacalia sinuata* La Llave et Lexarza (1824) are possibly conspecific with Sessé and Mociño's plants of the same

names. On the other hand *Ageratum viscosum* Ortega (1797), which is described as having linear-lanceolate leaves, can hardly be *A. viscosum* Sessé et Moc., which has ovate leaves, although the former was grown from seeds received from Sessé. Nor does *Cacalia peltata* H.B.K. (1820) appear to be the same as *C. peltata* Sessé et Moc.

Plantae Novae Hispaniae.

No work of later date than 1790 appears to have been consulted by the authors. Among those cited are Linn. Sp. Pl. ed. 1 (1753) (*Lantana corymbosa*), Sp. Pl. ed. 2 (1762–63) (*Salsola Salsa*), Syst. Nat. ed. 12 (1767) (*Verbesina Acmella*), Syst. Veg. ed. 13 (1774) (*Mimosa tenuifolia*), Linn. f. Suppl. (1781), Browne, Jam. (1756), Mill. Dict. ed. 8 (1768) (*Tournefortia suffruticosa* is cited with the diagnostic phrase given in ed. 8), Jacq. Amer. (1763), Jacq. Obs. (1764–71), Jacq. Hort. Vindob. (1770–76) (*Justicia ciliata*), Jacq. Fl. Austr. (1773–78), and Forsk. Fl. Aeg.–Arab. (1775).

Sessé and Mociño had apparently seen neither Aublet's Hist. Pl. Guiane (1775) nor Swartz's Prodr. Veg. Ind. Occ. (1788). *Ficus americana* Sessé et Moc. and *Ixia americana* Sessé et Moc. are evidently different from *F. americana* Aubl. and *I. americana* Aubl., while *Piper cordifolium* Sessé et Moc. and *Melastoma angustifolium* Sessé et Moc. are certainly not conspecific with the species of these names described by Swartz. The work of Linnaeus translated into Spanish by D. Antonio Palacios [Palau], mentioned in the preface to the Plantae Novae Hispaniae was presumably Palau's translation (1784–88) of the Species Plantarum.

That the date of completion of the Plantae Novae Hispaniae was not long after 1790 is suggested by the fact that the authors had evidently not seen the second volume of Cavanilles's Icones, for they describe a *Justicia coccinea* which is obviously different from *J. coccinea* Cav. Ic. ii. t. 199 (1793). Also their *Salvia bicolor* is certainly not conspecific with *S. bicolor* Jacq. Hort. Schoenbrunn. t. 7 (1797). *Eupatorium squarrosum* Sessé et Moc. may possibly be identical with *E. squarrosum* Cav. Ic. i. 66, t. 98 (1791), which Cavanilles described from a Mexican plant which flowered in the Botanic Garden, Madrid, and had doubtless been raised from seed sent by Cervantes, to whom Cavanilles in the preface acknowledges his indebtedness for seeds of rare plants from Nueva España. Sessé and Mociño do not cite Cavanilles's figure and description, so they presumably had not seen it. As the first volume of the Icones contains descriptions and figures of 6 new genera from Mexico and of at least 34 Mexican species, it would almost certainly have been purchased for the Botanic Garden, Mexico, not long after publication, say in 1792 or 1793, if not previously presented by the author.

According to Sessé and Mociño's preface the descriptions in the Plantae Novae Hispaniae were written in the field on a journey of three years' duration through Nueva España. Assuming that the manuscript was completed within six months or a year of the

travellers' return to Mexico City, the time occupied in its preparation would have been about $3\frac{1}{2}$–4 years. As they mention that almost half the work was completed in 1790, the year of publication of Ortega's edition of Hernandez, the date of completion of the Plantae Novae Hispaniae may be assigned provisionally to the year 1792, or possibly to 1793.

After completion of the Plantae Novae Hispaniae Sessé and Mociño revised some of their identifications. Thus under *Mespilus Pyracantha* is the note: "Descriptio *Crataegi Crus-galli* huc pertinet, errore enim *Mespilus* haec inter *Crataegi* species locata fuerat." Both these identifications of the "Texocotl" were erroneous. It is *Crataegus mexicana* Fl. Mex. Ic. Ined. ex DC. Prodr. ii. 629 (1825), which according to Stapf in Kew Bull. 1914, 297, is a synonym of *C. pubescens* (H.B.K., 1824) Steud. Standley, however, regards the two species as distinct.

Flora Mexicana.

This work, unlike the Plantae Novae Hispaniae, was never prepared for publication by its authors, and consists merely of a collection of descriptions bearing purely provisional identifications. About sixty species are unnamed, the place of the specific name being taken by a dash. One (following the genus *Samyda*) has neither generic name nor specific name. A new genus, *Guayabilla*, is represented by two species, *G. odorata* (*Guayabilla floribus decandris*) and a second, unnamed one (*Guayabilla floribus dodecandris*). According to Urban, Symb. Antill. iv. 418 (1910), the former is *Samyda spinulosa* Vent. and the latter is *S. dodecandra*, Jacq. Two species, *Samyda macrocarpa* and *S. rubra*, cited by De Candolle, Prodr. ii. 48 (1825) from "Fl. Mex. Ic. Ined." with the locality "Mexico" have long been regarded as problematical. Hemsley, Biol. Centr. Amer., Bot. i. 470 (1880), listed them as doubtful species, and Standley in Contrib. U.S. Nat. Herb. xxiii. 842 (1923) states that the generic position of both plants is doubtful. Comparison of Sessé and Mociño's description of *Guayabilla odorata* with the description and figure of *Samyda macrocarpa* leaves no room for doubt that these represent the same species, and similarly *Guayabilla floribus dodecandris* appears to be conspecific with *Samyda rubra*. De Candolle was apparently unaware that Sessé and Mociño's Icones included West Indian as well as Mexican plants, and the erroneous locality "Mexico" given by him has hitherto prevented the identification of *S. macrocarpa* and *S. rubra*. It may be useful to give the synonymy and distribution of the two species.

Samyda spinulosa *Vent.* Choix, t. 43 (1803); Urb. Symb. Antill. iv. 418; Britt. et Wils. in Sc. Surv. Porto Rico, v. 594. *S. macrocarpa* Fl. Mex. Ic. Ined. ex DC. Prodr. ii. 48 (1825); Alph. DC. Calques Fl. Mex. t. 183. *Guayabilla odorata* Sessé et Moc. Fl. Mex. ed. 2, 113 (1894).

West Indies. Puerto Rico and St. Thomas.

Samyda dodecandra *Jacq.* Enum. 21 (1760); Urb. Symb. Antill. iv. 418; Britt. et Wils. in Sc. Surv. Porto Rico, v. 594. *S. serrulata* L. Sp. Pl. ed. 2, 558 (1762). *S. rubra* Fl. Mex. Ic. Ined. ex DC. Prodr. ii. 48 (1825); Alph. DC. Calques Fl. Mex. t. 182.

West Indies. Widely distributed both in the Greater and Lesser Antilles.

Among other Puerto Rico species which have erroneously been assumed to be natives of Mexico are *Begonia decandra* Pav. and *Gesneria cuneifolia* Sessé et Moc.

About fifty names of species are duplicated in the Flora Mexicana, and some even occur in triplicate (*Peperomia tuberosa, Convolvulus umbellatus*). There are two species named *Ehretia Bourreria,* for example. The second, to which are appended citations belonging to *E. Bourreria* L., was described from a tree observed by the authors at Queretaro in Mexico. The first, which was collected in Puerto Rico, is without citations but was evidently identified subsequently by Sessé and Mociño as the true *E. Bourreria,* judging by their remark as to the Mexican tree: "corrige *Bourreriam* sequentem quae diversa e vera est et forte species nova." The identification of the Puerto Rico plant as *E. Bourreria* L. has been confirmed by Urban, Symb. Antill. iv. 521 (1910). Had Sessé and Mociño prepared the manuscript for press they would have transferred the citations to the first *E. Bourreria* and given the second species a different name.

Sessé and Mociño's Mexican Localities.

The West Indian and the few Central American localities mentioned by Sessé and Mociño offer little difficulty. Urban in his Flora Portoricensis has taken up the Puerto Rico plants cited by them. Their Mexican localities, however, are difficult to identify for several reasons. In many cases they are quite small places which are not included in any ordinary atlas or gazetteer; sometimes the spelling is so different from the modern form that a name may be almost unrecognisable to anyone unfamiliar with Spanish; and in a few cases the names are given in their classical, mediaeval or ecclesiastical Latin form. Also many different places in Mexico are named after the same saint. One of the localities cited very frequently is Mazatlan, which is not the well-known seaport of that name in Sinaloa, but a village near Chilpancingo in Guerrero, passed through by Humboldt and Bonpland in 1803. With regard to the spelling the following hints may be found useful. The letter "h" in words of Indian origin is frequently replaced by a "g," Acaguisotla and Acahuizotla for example being different forms of the same name. "Qu" is frequently replaced by "Cu" as in Quahnahuaca, the modern Cuernavaca. A "z" may be replaced by a "c" before an "e" or an "i" and by an "s" before an "a," "o," "u" or a consonant. The letters "x" and "z" are also used more or less indifferently: Ixtla, Iztla and Istla all being forms of one name. An "x" is now frequently replaced by a "j" e.g. Xorullo, Jorullo; and "oa" and "ua" are employed indifferently in many place

names, e.g. Coahuayana or Cuahuayana. Salmantica was the classical Latin name of Salamanca (Spain) and was employed for the town of Salamanca in Guanajuato, Mexico. Vallisoletum was the mediaeval Latin name for Valladolid (Spain), and was used by Sessé and Mociño for Valladolid de Michoacan, now known as Morelia. Michaelopolis and Angelopolis respectively are the ecclesiastical Latin names of San Miguel de Allende and Puebla (de los Angeles).

The area in Mexico explored by Sessé and Mociño, as evidenced by the localities cited by them, extends northwards to the States of Sinaloa, Nayarit (Tepic), Jalisco, Guanajuato, Queretaro, Hidalgo and Vera Cruz, and south-eastwards to the western parts of Tabasco and Chiapas. They appear to have collected very few plants in Sinaloa, Nayarit, Oaxaca, Chiapas and Tabasco. The Vera Cruz records are mainly in the Flora Mexicana, there being very few species cited in the Plantae Novae Hispaniae from Vera Cruz, Puebla and Hidalgo, so that the detailed exploration of these states was presumably subsequent to 1792 (*see* p. 421). Among those explored up to 1792 and hence represented in the Plantae Novae Hispaniae were Mexico, Morelos, Guerrero, Michoacan, Jalisco, Guanajuato and Queretaro. Jalisco and Michoacan are represented by numerous additional localities in the Flora Mexicana, so that Sessé and Mociño evidently revisited these States during the later period of their explorations.

The maps of various parts of Mexico given by Humboldt and Bonpland in their Atlas Géographique et Physique are very helpful in determining the position of Sessé and Mociño's localities, as they include numerous place-names, such as Agualulco (Ahualulco) not traced elsewhere. The writer's account of Humboldt and Bonpland's Mexican Itinerary may also be consulted. Some of Sessé and Mociño's Mexican localities have not been traced. An alphabetical list of those which have been determined is appended, the State in which each occurs being indicated. The following abbreviations are adopted: Chis. (Chiapas), Col. (Colima), Gto. (Guanajuato), Gro. (Guerrero), Hgo. (Hidalgo), Jal. (Jalisco), Mex. (Mexico), Mich. (Michoacan), Mor. (Morelos), Nay. (Nayarit, until recently known as Tepic), Oax. (Oaxaca), Pue. (Puebla), Qro. (Queretaro), Sin. (Sinaloa), Tlax. (Tlaxcala), Ver. (Vera Cruz).

Acahuizotla, Gro.; Acaponeta, Nay.; Acapulco, Gro.; Acatlipa, Mor.; Acayucan, Ver.; Agualulco (Ahualulco), Jal.; Alvarado, Ver.; Amatitlan, Jal.; Amatlan, Ver.; Amecameca, Mex.; Angelopolis, Pue.; Apam, Hgo.; Apatzingan, Mich.; Ario, Mich.; Atohuilco, Gto.; Atatonilco, Gto.; Atotonilco el Grande, Hgo.; Ayacapistla (Ayacapixtla), Mex.; Ayahualtempan, Gro.

Calpulalpam, Tlax.; Carmelitarum Eremus, Mex.; Chacalapa, Mich.; Chapala, Jal.; Chapalicum Mare, *i.e.* Lago de Chapala, Jal.; Chapultepec, Mex.; Chapultepec, Mor.; Chichipilco, Mex.; Chilapa, Gro.; Chilpantzingo, Gro.; Chucandaro (Chucandiro), Mich.; Citacuaro, Mich.; Coahuayana, Mich.; Coatzacoalcos, Ver.;

Colima, Col. ; Colima, Volcan de, Jal. ; Comangilla, Gto. ; Cordoba, Ver. ; Coyoacan, Mex. ; Cozoliacaque, Ver. ; Cuahunahuaca, Mor. ; Cuahuayana, Mich. ; Cuaxinipilapa, Gro. ; Cuitzeo, Laguna de, Mich. ; Cuyohuacan, Mex. ; Cuyuacan, Mex.

Eremus P.P. Carmelitarum, Mex. ; Espinal, Ver.

Guadalajara, Jal. ; Guanajuato, Gto.

Huasteca, Ver. ? ; Hostotpaquillo (Hostotipaquillo), Jal.

Ixtacalco, Mex. ; Ixtapalapan, Mex. ; Ixtla (Iztla), Qro. ; Ixtla, Puente de, Mor. ; Ixtlac, Qro. ; Ixtlahuaca, Mex.

Jucutacato, Mich.

La Punta, Ver. ? ; Legio (Leon), Gto.

Maltrata, Ver. ; Mazatlan, Gro. ; Metepec, Mex. or Hgo. ; Mextitlan (Meztitlan), Hgo. ; Mezquite, Sin. ; Michaelopolis, Gto.

Nandio, Mich.

Oaxaca, Oax. ; Ocotepec, Chis. ; Ocuapan, Ver. ; Orizaba, Ver.

Papantla, Ver. ; Paranquera, Gto. ; Paranques, Gto. ; Patzquaro, Mich. ; Puruandiro, Mich.

Quahunahuaca, Mor. ; Quaxinipilapa, Gro. ; Queretaro, Gro. ; Quyaucan, Mex.

Regla, Hgo.

Salamanca, Gto. ; Salmantica, Gto. ; San Agustin, Mex. ; San Andres de Tuxtla, Ver. ; San Angel, Mex. ; San Bartolomé, Qro. ; San Damiano, Gto. ; San Felipe del Obrage, Mex. ; San Francisco, Mex. ; San Gerónimo, Gro. ; San Juan de los Lagos, Jal. ; San Juan de los Plátanos, Mich. ; San Juan del Rio, Qro. ; San Lorenzo, Ver. ; San Martin de Tesmeluca, Pue. ; San Miguel de Allende, Gto. ; San Nicolas, Mex. ; Santa Ana de Amatlan, Mich. ; Santa Maria (Nuestra Señora) de los Remedios, Mex. ; Santa Maria de Tetela, Mor. ; Santa Monica, Hgo. ; Santa Rosa, Gto. ; Sararacua, Mich. ; Sayùla, Jal. ; Sinaloa, Sin. ; Sultepec, Mex.

Tacubaya, Mex. ; Tarimbaro, Mich. ; Tehuacan, Pue. ; Temascaltepec, Mex. ; Temascatio, Gto. ; Tenampulco, Ver. ? ; Tepalcatepec, Mich. ; Tepecuacuilco, Gro. ; Tepelpa, Mex. ; Tepetlapa, Gro. ; Tepetlpa, Mex. ; Tepic, Nay. ; Tepoztlan (Tepostlan), Mor. ; Tequila, Jal. ; Tesmeluca, San Martin de, Pue. ; Tetela, Santa Maria de, Mor. ; Tezcuco, Mex. ; Teziutlan, Pue. ; Tixtla, Gro. ; Tlacotalpam, Ver. ; Tlaltenango, Mor. ; Tlapa, Gro. ; Toluca, Mex. ; Tonila, Col. ; Tospa, Ver. ; Tulancingo, Hgo. ; Tuxtla (Tustla), Ver.

Uruapan, Mich.

Valladolid, Qro. ; Valle de Santiago, Gto. ; Valle, Oppidum del, *i.e.* Valle de Santiago ? ; Vallisoletum, Qro. ; Vera Cruz, Ver.

Xochitepec, Mor. ; Xorullo, Mich.

Yecapixtla, Mor.

Zacatlan, Pue. ; Zapotlan, Jal. ; Zitacuaro, Mich. ; Zitlala, Gro. ; Zitlalan, Gro. ; Zumpango, Mex.

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LII.—INLAND OCCURRENCE OF IPOMOEA PES-CAPRAE. I. H. Burkill.

This valued sand-binder occurs so plentifully and widely upon tropical sea-coasts that it is well known to every botanist who has visited them. But that it is able to maintain itself in inland situations is not generally known, and the records given below are of interest since they show that it occurs on the

western side of the Malay Peninsula at some distance from the sea shore where the natural vegetation has been disturbed by man. Mr. Ridley, who observed it in 1920 (Journ. Roy. As. Soc., Straits Branch, 86, p. 301, 1922), suggested that it may have been introduced in a load of sea sand. This, however, appears to be doubtful from the fact that its occurrence inland is reported in some of the earliest records of botanical exploration of the country; and as it is now known to occur in several inland situations such a means of introduction, though it might happen once, becomes improbable for all.

Mr. Ridley has also recorded (loc. cit.) that he observed, apparently in 1920, *Ipomoea Pes-caprae* upon a railway embankment near Kota Bahru in Kelantan. This railway embankment is relatively new, and the position is close to the head of a small sandy delta, so that there is much less of the unexpected in the existence of the plant at this place than in the finding of it in the interior of the Peninsula upon the other or western side.

It appears likely that it has penetrated inland along the roads following the opening of the country which proceeded from Malacca. The first roads through these parts were made after 1850, and they were extended beyond Seremban after 1880.

Mr. C. E. C. Fischer reports that he has found it in the Madura district of the Madras Presidency at Sendurai, which is a long distance from the sea and at an elevation of 1300 ft. In the Herbarium at Kew, there is also a specimen from the village of Buddi-reddi-patti in the Salem district, a spot equally remote from the coast.

It would appear that *Ipomoea Pes-caprae* might prove a useful cover for abandoned mine workings within the area where it has been found to exist inland. Should the experiment be made care should be taken at the time of sowing to see that the surface of the ground is of an open texture.

The following are records of *Ipomoea Pes-caprae* in inland localities in Malacca and Negri Sembilan. The distances from the sea are measured from the locality to the nearest sea shore in a straight line; the other distances are by road.

Belimbing, 13½ miles from Malacca, 10 miles from the sea; *Burkill*, Nov., 1918. North of Alor Gajah, 16 miles from Malacca, 10½ miles from the sea, *Burkill*, Nov., 1916. Sempang Ampat, 20 miles from Malacca, 11 miles from the sea, *Burkill*, July 1917. Chirana Puteh, 23 miles from Malacca, 13 miles from the sea, *Alvins* (Cantley's collector), Feb., 1885. Tanjong Rimau, 21 miles from Malacca, 15 miles from the sea, *Burkill*, Nov., 1918. Pulau Sabang, 23 miles from Malacca, 14½ miles from the sea, *J. S. Goodenough*, May, 1894. Near Tampin, 25 miles from Malacca, 15½ miles from the sea, *Burkill*, June 1921. Bukit Tangga pass, 35 miles from Port Dickson, 66 from Malacca, 17½ miles from the sea, *Ridley*, Dec., 1920.

LIII.—MISCELLANEOUS NOTES.

The following appointment has been made by the Secretary of State for the Colonies:—Mr. D. Sturdy, Assistant Agricultural Officer, Tanganyika Territory.

William Fawcett.—We regret to record the death of Mr. William Fawcett, which took place suddenly at his residence at Blackheath on August the 14th. Born in 1851, he became a master at Southborough School, Tunbridge Wells, and graduated B.Sc. at London University. He then hesitated between devoting himself to mathematics or to a branch of natural science, but success in 1880 in obtaining an Assistantship in the Botanical Department of the British Museum determined his career. With his colleague, Mr. H. N. Ridley, he assisted in transferring the collections from Bloomsbury to South Kensington. In 1884 his first botanical paper, "Dialysis and Synanthy in Primula," appeared in the Journal of Botany, and in 1886 one on *Balanophora* and *Thonningia* in the Transactions of the Linnean Society. Several other papers from his pen appeared about this period, and he remained at the British Museum until the end of 1886, when he became Director of Public Gardens and Plantations in Jamaica, in succession to Mr. (now Sir) Daniel Morris, who had then been appointed Assistant Director at Kew. He took up his appointment in 1886, and immediately threw himself into his work. He edited the Bulletin of the Botanical Department of Jamaica from April, 1887, until 1902, and when the Department was amalgamated with that of Agriculture, he undertook the editorship of the new bulletin from 1903 until his retirement in 1908. These publications contained many articles from Fawcett's own pen, noticeable among them being a "Provisional list of the Indigenous Flowering Plants of Jamaica" (1893); "An Index to Economic Products of the Vegetable Kingdom in Jamaica" (1893); and "Historical Notes on Economic Plants in Jamaica" (1908), the last dealing largely with the attempt to produce cigars and tobacco in Jamaica. Encouraged by the formation in 1898 of the Imperial Department of Agriculture, with Sir D. Morris as Commissioner, Fawcett vigorously threw himself into the task of developing new vegetable resources to take the place of the then threatened failure of the sugar crop, which had hitherto been almost the sole industry of Jamaica. The worth of this can be estimated by the value of the exports in 1924, that of sugar being £497,723, while fruit and nuts had risen to £1,432,476, coffee to £225,449 and cocoa to £82,022. In addition to his writings he also delivered lectures, and in 1891 rendered valuable service in connection with the Imperial Exhibition in Jamaica.

Fawcett returned to England in 1908 and commenced, with Dr. A. B. Rendle, a Flora of Jamaica, the first volume of which, dealing with *Orchidaceae*, was published in 1910, and was succeeded by vols. iii., iv. and v., the last of which appeared in July, 1926.

During the progress of this work Fawcett frequently visited Kew to examine Jamaican collections not represented at the British Museum, the last occasion being on July the 29th. He also found time in 1913 to write a book on "The Banana: Its Cultivation, Distribution and Commercial Uses", a subject on which his experience in Jamaica had rendered him well qualified to write.

Mr. Fawcett became a Fellow of the Linnean Society in 1881, withdrew in 1915, but rejoined in 1923. C. H. W.

Sir George Holford.—Horticulture has sustained no severer loss in recent years than that caused by the death on September 11th of Lieut.-Colonel Sir George L. Holford, K.C.V.O., C.I.E., C.B.E., and Kew thereby has been deprived of an old and generous friend. Very few private establishments in this country have been able to practice gardening in so many branches and in such perfection as Westonbirt during the last thirty years under Sir George's direction. His orchids, Hippeastrums and Clivias have long represented the highest types of quality and cultivation, and for many years the exhibits he made at the Royal Horticultural Society's shows have been amongst the chief events in the gardening world.

No feature of Westonbirt was more admired than the Arboretum. It was commenced many years ago by Sir George's father, Robert Stayner Holford, and enthusiastically maintained by his son. Amongst the private collections of hardy trees and shrubs in England it has few rivals in regard to the size and beauty of its individual specimens combined with a richness in number of species and an admirable planting. In no garden in England, perhaps, is the autumn colouring of trees and shrubs so rich and varied as at Westonbirt, and it was one of Sir George's greatest pleasures to entertain every year a succession of visitors there to enjoy its beauties at that season.

Sir George's first gift to Kew was one hundred Hippeastrums sent in March, 1895; his last a tree of *Acer rufinerve* var. *limbatum* in February, 1924. Between those dates he made numerous presentations, including three other consignments of Hippeastrums and many orchids. Two consignments of the latter were especially generous—over two hundred plants in January, 1913, and over six hundred in April, 1922. Many of these were hybrid Cattleyas and Laelias raised at Westonbirt, and their flowering has given much enjoyment year by year to visitors to the Gardens.

Sir George was born June 2nd, 1860, and was buried at Westonbirt on Tuesday, September 14th, Kew being represented at his funeral by the Assistant Director.

A Nature Reserve in Wellington, New Zealand.—We have received from Dr. L. Cockayne, F.R.S., a most interesting account of a project for the establishment of a natural vegetation reserve at Wilton's Bush, Wadestown, within the boundaries of the City

of Wellington, and less than three miles from the centre of the city.

The object of the scheme is to present a vivid picture of the plant-life of New Zealand, to show the species of which the vegetation is composed, and to illustrate their use for horticultural purposes. The main features of this open-air museum will be (1) a well-grown collection of, as far as possible, all the species of the New Zealand flora from the North Cape to the south of Stewart Island, including the Kermadecs, Chathams, and Sub-Antarctic Islands, arranged for the most part in systematic order; (2) representations on a fairly large scale of the leading plant-associations of the land as they existed in primeval New Zealand; (3) illustration of the horticultural uses of suitable New Zealand plants; (4) restoration of the forest as far as possible to its primitive condition.

The crux of the whole scheme is the reproduction of the rapidly disappearing primeval vegetation of New Zealand. Day by day its area grows less; some associations are gone for ever, others are most limited in extent. It is hoped to perpetuate the glories of this vegetation in a way which can never be accomplished by photographs or within the walls of a museum.

Dr. Cockayne points out that much of the forest in the Reserve has been greatly modified, and even damaged. The plants are very slowly being restored, but not in their original form, and the work can be accomplished much more rapidly by human agency. It has, however, been clearly recognised that no species should be added to the bush which does not properly belong to that class of forest—the semi-coastal forest of Wellington. The intention is, strictly, to bring back the forest to its original composition and status.

In his covering letter Dr. Cockayne says:—

"Some of the present forest is very fine and virtually virgin, but the greater part has had the tall trees removed years ago and now largely consists of *Brachyglottis repanda*. Of course it will be impossible to reproduce certain of the plant associations of New Zealand, e.g. those of the Sub-Antarctic Islands, but a considerable number can be imitated and their members should grow quite well. It is the systematic part which will give the most trouble, since certain species will refuse to grow at all alongside their relatives, e.g., lowland and sub-alpine podocarps. Anyhow, to attempt to overcome difficulties adds special zest to horticulture."

It is unnecessary to stress the importance of this scheme from both the educational and aesthetic points of view. Its development, which will of course be a matter of many years, will be watched with the greatest interest. One may hope that this example will stimulate the establishment of similar reserves in many other parts of the world, so as to preserve authentic illustrations of characteristic vegetation, which is everywhere giving way before civilization and cultivation.

Oil-Palm Briquettes.—An interesting feature in the operations of a palm oil factory in existence on the Gold Coast is the use made of the waste fibre accumulating after the extraction of the pericarp oil, and from the shells of the palm "nuts" after cracking and removal of the kernels has been effected. A fuel briquette is made from these two waste products and constitutes the sole fuel used on the small locomotives for hauling palm fruit from the outlying collecting areas to the central factory. The briquettes are most convenient for this purpose, being easy to handle, fairly durable, and burning with much heat. The composition is approximately 55 per cent. shell and 45 per cent. fibre by weight; the briquettes being disc-shaped with a diameter of 10–11″ and thickness 2½–3″. The fibre and shell being well mixed before moulding, the pressure of the moulds compresses fibre and shell into a dense compact mass, rendering the addition of any outside binding material unnecessary. F. N. H.

The Flora of Jamaica.*—A copy of Volume v of this valuable work by the late Mr. W. Fawcett and Dr. A. B. Rendle (which appeared in July last) has been presented to the Library of the Royal Botanic Gardens, Kew, by the Trustees of the British Museum. The present volume continues the systematic account to the end of the free-petaled Dicotyledons, forty-four families being dealt with (including *Garryaceae* omitted from the 3rd volume). Each genus is well illustrated, and a full index is given.

Edible and Poisonous Fungi.†—Owing to the demand for this useful little handbook, which has been out of print for some years, a new edition has been published. Seven new plates by Miss E. M. Wakefield have been substituted, and the nomenclature and descriptions of the various fungi have been brought up to date. With the new plates and the amplified descriptions the value of the handbook is greatly increased.

Carnations.‡—This, the latest book on Carnations, runs to nineteen chapters, including one on the history of the various classes of Carnations and Pinks. The author has a lifelong experience of carnation growing on commercial lines, and all the cultural details,

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* Flora of Jamaica: containing descriptions of the flowering plants known from the island, by W. Fawcett and A. B. Rendle. Vol. v. Published by the Trustees of the British Museum, London, 1926. Pp. xxviii+453, text figs. 156. Price 25s.

† Ministry of Agriculture and Fisheries, 10, Whitehall Place, London, S.W. 1, 1926, pp. 29, coloured plates 25. Price, cloth boards, 3/-, post free, quarter boards, 2/6, post free.

‡ By Montagu C. Allwood. Country Life, 20, Tavistock Street, Covent Garden, W.C. 2. 1926. Pp. xvi + 139, ill. 99. Price 12s. 6d.

from the various methods of propagation and cultivation are dealt with in a very efficient way, and in such detail that the veriest beginner should have no difficulty in grasping the various cultural details of this charming class of plants. The book also includes much valuable information for both the skilled amateur and commercial grower. Soils, manures, and the various types of growing houses are dealt with in a very helpful manner. Chapters on diseases and insect pests and the various methods of controlling them are also included. The book is profusely illustrated, with excellent illustrations, showing in a very helpful manner the many operations connected with the cultivation of this class of plant. In dealing with the history of the Perpetual Carnation, the author states that it is the product of several centuries of hybridization and culture, from *Dianthus chinensis*, the Indian or China Pink ; it would be interesting to know on what authority the author makes this statement, as the plant in question is an annual species introduced in 1713.

Citrus Growing.*—In view of the increasing importance of the trade in Oranges and other Citrus fruits from South Africa, a book on Citrus growing in the Union seems well-timed. The commencement of the industry dates from about 1907 subsequent to the first exhibit of Citrus fruits, chiefly from the Transvaal, at the Royal Horticultural Society's Exhibition of Colonial Fruits at Westminster, June, 1906. From then onwards the exports have steadily increased from small beginnings to the present time, when the productive area is estimated to cover 25,000 acres. The industry is now so well established that large consignments of Oranges and smaller quantities of Grape-fruit, Naartjes (Mandarin and Tangerine Oranges) and Lemons, arrive at Southampton nearly every week, at the present time of year. At the moment it does not seem possible to determine the limits of future imports. This excellent position has not been arrived at without considerable energy and the surmounting of many difficulties on the part of the various Departments of Agriculture in the Union, the sympathy of the Colonial Government and the co-operation of the Steamship Companies. The author of the work under notice has given a very complete record of the progress of the production, based on the scientific work of his Department in developing the cultivation of the best varieties, the best methods of grading and packing of the fruit for export and advice on the treatment of diseases and pests ; the book is well illustrated throughout.

J. H. H.

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* Citrus Growing in South Africa, by R. A. Davis. L. Reeve & Co., Ltd., London, 1924. Pp. 309, numerous illustrations. Price £1 5s.

Botanical Magazine.—Part iv of Volume cli (1925) was published on September 21st, 1926, and contains plates and descriptions of the following plants :—

Rhodospatha Forgetii N.E.Br. (t.9105), from Costa Rica; *Cotoneaster ambigua* Rehder & Wilson (t.9106), from altitudes of about 3000 m., Central Szechuan to N.W. Yunnan; *Primula Inayatii* Duthie (t.9107), from the Western Himalaya and Kashmir; *Fritillaria libanotica* Baker (t.9108), a native of dry stony ground in Palestine and South Syria; *Cirropetalum miniatum* Rolfe (t.9109), an orchid with brilliant orange coloured flowers, from Annam and Upper Laos; *Brunnera macrophylla* I. M. Johnston (t.9110), frequently mistaken for a *Myosotis*, from Western Caucasia; *Sargentodoxa cuneata* Rehder & Wils. (tt.9111, 9112), an interesting climbing shrub from Central China, is discussed at length and its position determined in a new Natural Family, the SARGENTODOXACEAE, between the Schizandraceae and Lardizabalaceae; *Diplomeris hirsuta* Lindl. (t.9113), a rare orchid from the Central Himalaya, Nepal to Bhutan; *Anemone glauciifolia* Franch. (t.9114), from N.W. Yunnan and the Szechuan borderland; and *Scabiosa anthemifolia* Ecklon and Zeyher (t.9115), from Cape Colony.

South African Flowers.*—The Wild Flower Protection Society of South Africa, is to be congratulated on the publication of a popular book on the protected wild flowers of the Cape Region. The Society was fortunate in having secured the services of Mrs. H. M. L. Bolus, Curator of the Bolus Herbarium and one of the most prominent of South African botanists. In collaboration she has had the assistance of Miss D. Barclay and Mr. E. J. Steer, who have provided a series of interesting paintings and photographs respectively. The descriptions are charmingly written and many of the plants figured are familiar objects in our gardens. This book should prove to be very useful to visitors and of considerable interest to many of us at home who are interested in the Cape Flora, besides attaining its principal object which is to secure the preservation of these plants in their wild state.

I. C. V.

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* A Book of South African Flowers, by D. Barclay, H. M. L. Bolus, E. J. Steer. Pp. xviii+174, ill. 57. L. Reeve & Co., London, 1925. Price 21s.

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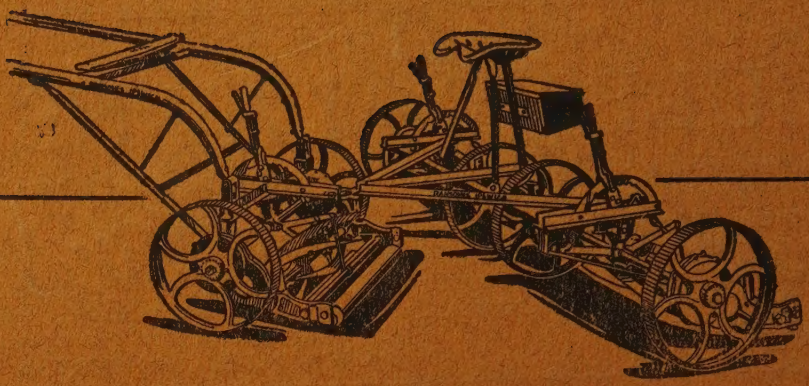

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